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# Two new species of the genus *Sitana* Cuvier, 1829 (Reptilia: Agamidae) from Sri Lanka, including a taxonomic revision of the Indian *Sitana* species

A. A. THASUN AMARASINGHE[1,6], IVAN INEICH[2], D. M. S. SURANJAN KARUNARATHNA[3], W. MADHAVA S. BOTEJUE[4] & PATRICK D. CAMPBELL[5]

[1]*Research Center for Climate Change, University of Indonesia, Gd. PAU Lt. 8.5, Kampus UI, Depok 16424, Indonesia*
[2]*Muséum national d'Histoire naturelle, ISYEB (Institut de Systématique, Évolution et Biodiversité), UMR 7205 CNRS, EPHE, MNHN, UPMC, 57 rue Cuvier, CP 30 (Reptiles) – F-75005 Paris, France*
[3]*Nature Explorations and Education Team, No: B-1 / G-6, De Soysapura Housing Scheme, Moratuwa 10400, Sri Lanka*
[4]*Taprobanica Nature Conservation Society, 150/6, Stanley Thilakaratne Mawatha, Nugegoda, Sri Lanka*
[5]*Department of Life Sciences, Darwin Centre, Natural History Museum, Cromwell Road, South Kensington, London SW7 5BD, England*
[6]*Corresponding author. E-mail: thasun@rccc.ui.ac.id*

## Abstract

The genus *Sitana* was described by Cuvier (1829) on the basis of a single species, *S. ponticeriana*. The secondly described, *Sitana minor* Günther, 1864, is identical to *S. ponticeriana* Cuvier, 1829, and should be considered as a junior objective synonym of the latter. The syntypes of *S. deccanensis* Jerdon, 1870 have been rediscovered, misplaced among the syntypes of *S. minor* (sensu Boulenger 1885) at the Natural History Museum (London) and the former taxon is here recognised as a valid species and redescribed. There is some doubt surrounding the taxon *Sitana ponticeriana mucronata* Deraniyagala, 1957. Its type is lost and no live populations have been found since its original description; therefore, we here consider this trinomen as a *nomen dubium*. The *Sitana* populations which are distributed in drier and warmer areas of the lower peneplain of Sri Lanka are sufficiently different from the known Indian species and are thus herein described as new species. The two new species, *Sitana bahiri* **sp. nov.** and *Sitana devakai* **sp. nov.,** differ from mainland Indian congeners by having the following combination of characters: SVL 40.0–50.0 mm; axilla-dewlap length 28.3–32.5% of axilla-groin length; snout length 54.7–63.2% of head width; femur length 70.6–78.4% of tibia length; foot length 154.7–180.2% of head length; 49–59 midbody scales; 87–108 ventral scales; unequal and irregular lateral scales with intermediate enlarged scales; 7–9 supralabials; 14–17 subdigital lamellae on toe III; 21–26 subdigital lamellae on toe IV; enlarged scales above the tympanum; a single pale stripe from the snout up to the shoulder. *Sitana bahiri* **sp. nov.** differs from *Sitana devakai* **sp. nov.** by having ventrals 87–89 (vs. 100–108), mucronate lateral scales (vs. rounded) in males, and rounded (vs. mucronate) ventral scales in females, plus several other characters discussed later . The remaining *Sitana* populations in India seem to represent several undescribed species, but extensive field work and molecular studies are needed in order to obtain better knowledge. We believe this study, which provides descriptions for all the recognised Indian species, will go some way in stabilizing the nomenclature for this group of common agamid lizards.

**Key words:** biogeography, fan-throated lizard, lectotype, *Sitana ponticeriana*, syntype, taxonomy

## Introduction

The fan-throated lizard genus *Sitana*, was described by Cuvier (1829) on the basis of a single species, *S. ponticeriana*. Wagler (1830) erected a new genus, *Semiophorus*, and designated *Sitana ponticeriana* as its type species (spelled "*pondiceriana*"). Later, Wiegmann (1834) corrected the species name to the masculine gender as *Semiophorus pondicerianus*. Duméril & Bibron (1837) specified that *Sitana ponticeriana*'s name (Sitane de Pondichéry) was attributed by Cuvier (1829) since the first specimen received in the Muséum national d'Histoire naturelle, Paris, France (MNHN) was collected from Pondichéry (today Puducherry), India, sent by Leschenault. We accept that in doing this, they have implicitly restricted the type locality "Indes Orientales" to Pondichéry, and

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have also designated MNHN 6901 as the lectotype, since this was the only specimen available collected from this locality, Pondichéry (Duméril & Bibron 1837). Wermuth (1967) erroneously credited the terra-typica restriction of *S. ponticeriana* to Smith (1935). Brygoo (1988) could not find the specimen collected from Pondichéry in the MNHN collections and considered it lost or misplaced, but Amarasinghe *et al*. (2009) subsequently found it again and thoroughly examined this lectotype, although they mistakenly regarded it as the holotype. Kelaart (1854) was the first to report *S. ponticeriana* from Sri Lanka. Subsequent authors have mostly accepted the view that there is a unique species present from India and Sri Lanka [e.g. Deraniyagala (1953), Taylor (1957), Manamendra-Arachchi & Liyanage (1994), Das (1996), Das & de Silva (2005), de Silva (2006), and Somaweera & Somaweera (2009)]. Previous authors had only studied specimens from a very restricted geographic area and this may be the reason why populations were identified independently (without comparison) and thus all of the specimens were attributed to a unique species, *S. ponticeriana*.

In 1864, Günther described *Sitana minor* from Madras (today Chennai) which is only ~150 km away from the type locality of *S. ponticeriana*. Günther (1864) failed to mention how many specimens he examined, but it is clear from the description that he had several specimens at his disposal at the time. Furthermore, he considered it more probable that the Ceylonese (=Sri Lankan) *Sitana* populations were conspecific with the Madras species. A third species of *Sitana* was later described by Jerdon (1870) as *Sitana deccanensis* but without a precise locality. The toponym certainly refers to the whole Deccan Plateau of India, which is a massive area covering most of central and southern India and located between the Western Ghats and the Eastern Ghats mountain ranges. Furthermore, its description is restricted to only a few lines, and the author did not mention exactly how many specimens he author based his description on. Since the publication of that description, the type material has long been considered lost (Smith 1935), until five specimens (ZSI5051–55) from the Kolkata Museum, Zoological Survey of India (ZSI) were rediscovered by Das *et al*. (1998), and recognized as syntypes. Boulenger (1885) synonymised both species (*S. minor* and *S. deccanensis*) with *S. ponticeriana* and that position has been widely accepted by subsequent workers. He also stated that the syntypes of *S. minor* consisted of eight specimens but there are actually ten specimens labelled as "cotypes of *S. minor*" in the BMNH catalogue. Even though Smith (1935) also accepted Boulenger's synonymy, he mentioned two distinct morphotypes within Indian *S. ponticeriana*, a *large* and a *small* form. He included *S. minor* as the *smaller* form and *S. deccanensis* as the *larger* form but *S. ponticeriana* was left as an intermediate body size form.

In 1957, Deraniyagala described a subspecies from Hiniduma (at 600 m elevation in the wet zone) in Sri Lanka as *Sitana ponticeriana mucronata*; he considered the remaining *Sitana* population in Sri Lanka (Chundikulam, Pt. Pedro, Tunukai, Mannar, Mankulam, Mullaitivu, Kumana, Trincomalee, Puttalam, Bathuluoya, Palatupana, and Pallaipothana) and India as *S. ponticeriana ponticeriana* (Deraniyagala 1957). However, *S. p. mucronata* was later synonymised with the monotypic *S. ponticeriana* by Wermuth (1967). The holotype of *S. p. mucronata* is lost or misplaced, and no live populations have been found since its original description. Bahir & Silva (2005) argued that *S. p. mucronata* could refer to a misidentified *Otocryptis wiegmanni* Wagler, 1830, a sister genus of *Sitana* (Moody 1980, Macey *et al*. 2000, Pyron *et al*. 2013).

Schleich & Kästle (1998), Schleich *et al*. (1998), and Anders & Kästle (2002) described three additional *Sitana* species from Nepal: *S. fusca* Schleich & Kästle, 1998; *S. sivalensis* Schleich, Kästle & Shah, 1998; and *S. schleichi* Anders & Kästle, 2002. However, Indian populations are still being considered as monospecific in most recent works [e.g. Andhra Pradesh (Guptha *et al*. 2012; Reddy *et al*. 2013); Orissa State (Pal *et al*. 2007, 2011); Karnataka State (Shanbhag *et al*. 2003); Gujarat State (Patankar *et al*. 2013; Trivedi *et al*. 2013); Tamil Nadu State (Das 2010; Tsetan & Ramanibai 2011; Ramesh *et al*. 2013); Maharashtra State (Deshpande *et al*. 2012; Watve 2013); and Uttar Pradesh (Nair & Krishna 2013)].

Our Sri Lankan material shows several distinctive characters when compared to Indian and Nepalese specimens. Taxonomic studies on numerous animal taxa have shown that several populations from Sri Lanka are in fact distinct from those from India at various taxonomical levels and are often endemic to the island (see Bossuyt *et al*. 2004; Manamendra-Arachchi & Pethiyagoda 2005; Pethiyagoda *et al*. 2012). It was also noticed that faunal differentiation is quite marked between wet, dry, and cloud forest zones of Sri Lanka and the dry zones of southern India (Helgen & Groves 2005). Thus, here we describe the Sri Lankan populations as two distinct new species.

## Material and methods

Museum acronyms follow Sabaj Pérez (2014). We examined specimens from the collections based at the Natural History Museum, London, UK (BMNH); Bombay Natural History Society, Mumbai, India (BNHM); Muséum national d'Histoire naturelle, Paris, France (MNHN); National Museum of Sri Lanka, Colombo, Sri Lanka (NMSL); Wildlife Heritage Trust, Colombo, Sri Lanka (WHT); Museum für Naturkunde, Berlin, Germany (ZMB); Zoologisches Museum von Hamburg, Hamburg, Germany (ZMH); Zoological Survey of India, Kolkata (ZSI); and Zoological Survey of India, Chennai (ZSI/SRS). All the BMNH specimens which were collected after Jerdon (1870) were excluded as they could not be the potential syntypes of *S. minor* and *S. deccanensis*. The allopatric smaller bodied *Sitana* species described from Nepal (hereafter *S. sivalensis* complex) were not included in our analysis, as they were easily distinguishable (see later) from all *Sitana* species discussed in this paper. We used a Leicawild M3Z dissecting microscope to examine the external morphology of specimens and a Cannon EOS 7D SLR digital camera to take photographs. Information concerning the conservation status and risk of extinction of the new species was assessed based on the Red List Categories and Criteria in IUCN Standards and Petitions Subcommittee (2013; version 10.1). Sex of adults was determined by the presence or absence of a throat-fan, a dimorphic sexual character only present in males.

The following characters were measured with a Mitutoyo digitmatic caliper to the nearest 0.1 mm and only along the left side of the body for symmetrical characters: snout–vent length (SVL): measured from tip of snout to anterior margin of vent; throat-fan length (DWL): distance between posterior end of throat-fan and tip of snout; axilla–groin length (AG): distance between axilla and groin; axilla–throat-fan length (ADW): distance between axilla and posterior end of throat-fan; head length (HL): distance between posterior edge of mandible and tip of snout; head width (HW): maximum width of head; head depth (HD): distance between occiput and throat; eye–nostril length (EN): distance between anteriormost point of orbit and middle of nostril; snout length (ES): distance between anteriormost point of orbit and tip of snout; internarial distance (IN): least distance between the inner margins of nares; eye diameter (ED): horizontal diameter of orbit; interorbital width (IO): least distance between upper margins of orbits; tympanum–eye length (TYE): distance between anterior most margin of tympanum and posterior most margin of eye; tympanum diameter (TYD): longest diameter of the tympanum; upper arm length (UAL): distance between axilla and angle of elbow; lower-arm length (LAL): distance from elbow to wrist with both lower arm and palm flexed; femur length (FEL): distance between groin and knee; tibia length (TBL): distance between knee and heel, with both tibia and tarsus flexed; foot length (FOL): distance between heel and tip of longest toe; tail base width (TBW): largest diameter of the tail base; tail length (TAL): from anterior margin of vent to tail tip. Meristic characters were taken as follows: supralabials (SUP) and infralabials (INF): first labial scale to last labial scale towards gape, which is distinctly larger than the granular scale at gape; midbody scales (MBS): counted from centre of mid-dorsal row around midbody; subdigital lamellae on toe III and toe IV (SDL): from first proximal scansor at the fork of digit, to distal most lamella at tip of digit; ventral scales (VEN): counted from first postmental to cloacal opening, along the throat-fan. All data were taken by A.A.T. Amarasinghe (specimens at BMNH, BNHM, NMSL, WHT, ZSI, and ZSI/SRS), I. Ineich (MNHN and ZMB), and Jakob Hallermann (ZMH).

Morphometric data for species comparisons were obtained only from adult male specimens (see below) because the females show less distinctive diagnostic characters than males and their specific identification may be uncertain. Also, the type material of *S. ponticeriana* and *S. deccanensis* contains no females.

Natural history observations were made by eye at a distance of at least 3–4 m away from the animal, with minimum disturbance. The eggs were measured with the same calliper to the nearest 0.1 mm, before the egg being carefully deposited back into its original nest hole. Standard thermometer, hygrometer and lux meters were used to record the environmental parameters during observations. All the distribution records were taken from our personal notes and museum specimens examined. Altitudes are given in meters above mean sea level.

## Results

Standard morphometric and meristic data of adult type materials are presented in Tables 1 and 3.

***Sitana bahiri* sp. nov. Amarasinghe, Ineich & Karunarathna**
(Figs. 1–3; Tables 1–3)

*Litana Ponticereana* [sic]—Kelaart (1854) [*partim*].
*Sitana ponticeriana*—Smith (1935) [*partim*]; Taylor (1957) [*partim*]; Wermuth (1967) [*partim*]; Manamendra-Arachchi & Liyanage (1994) [*partim*]; Erdelen (1998) [*partim*]; Das & de Silva (2005) [*partim*]; de Silva (2006) [*partim*]; Somaweera & Somaweera (2009) [*partim*]; Manthey (2010) [*partim*].
*Sitana ponticeriana ponticeriana*—Deraniyagala (1953) [*partim*].
*Sitana ponticertiana* [sic]—Bahir & Surasinghe (2005) [*partim*].

**Holotype.** Male, WHT 1434A, SVL 45.0 mm, collected at Block 1, Yala National Park, Sri Lanka (6°22′N, 81°31′E), alt. 5 m, by D. Gabadage, 27 May 1995.

**Paratypes.** Males, WHT 7377, WHT 0206C–D, respective SVL 40.5 mm, 50.0 mm, and 48.8 mm, collected at Bundala National Park, Sri Lanka (6º11′N, 81º16′E), alt. 5 m, by A. Silva & K. Maduwage, 19 August 2006; Male, WHT 0619, SVL 44.7 mm, collected at Weligatta-Bundala, Sri Lanka, by D. Gabadage, 27 May 1995; Male, ZMH R06344, SVL 43.3 mm, collected in S.E. Sri Lanka, gift from Nat. Mus. Basel, collector Sarasin, 13 December 1904; Females, WHT195A–B, respective SVL 46.8 mm and 46.9 mm, collected at Mahapelessa, Kirinda, Sri Lanka (6°23′N, 81°31′E), alt. 5 m, by D. Gabadage, 9 January 1993; Females, WHT 0206A–B, respective SVL 44.1 mm and 43.6 mm, collected at Bundala National Park, Sri Lanka, by D. Gabadage, 27 May 1995; Subadult male, WHT 1434B, SVL 32.9 mm, collected at Block 1, Yala National Park, Sri Lanka (6°22′N, 81°31′E), alt. 5 m, by D. Gabadage, 27 May 1995; Subadult female, WHT 1434C, SVL 34.0 mm, collected at Block 1, Yala National Park, Sri Lanka (6°22′N, 81°31′E), alt. 5 m, by D. Gabadage, 27 May 1995.

**Diagnosis for adult males.** *Sitana bahiri* **sp. nov.** differs from all congeners by having the following characters: ***S. devakai* sp. nov.** (see below): shorter throat-fan ADW 28.3–29.2% of AG (vs. long, ADW 29.9–32.5% of AG), midbody scale number 49–56 (vs. 57–59), ventral scale number 87–89 (vs. 100–108), abdominal scales bluntly pointed (vs. pointed), unequal and irregular lateral scales with intermediate enlarged scales (vs. equal and regular lateral scales with intermediate enlarged scales), breeding-males with bleached orange colour patch (vs. bright red colour patch); ***S. deccanensis*:** smaller SVL 40.0–50.0 mm (vs. large SVL, above 60.0 mm), longer snout ES 54.7–57.4% of HW (vs. shorter, ES 53.1–53.4% of HW), shorter throat-fan ADW 28.3–29.2% of AG (vs. longer, ADW 50.3–60.2% of AG), shorter femur FEL 70.6–75.3% of TBL (vs. longer, FEL 79.7–82.9% of TBL), longer foot FOL 158.9–159.8 of HL (vs. shorter, FOL 131.9–144.6% of HL), supralabial number 7–8 (vs. 12), midbody scale number 49–56 (vs. 66–70), subdigital lamellae number on toe III 14–17 (vs. 13), subdigital lamellae number on toe IV 23–26 (vs. 19–23), enlarged scales above the tympanum present (vs. absent), unequal and irregular lateral scales with intermediate enlarged scales (vs. equal and regular lateral scales without enlarged scales), breeding-males with bleached orange colour patch (vs. bright red patch extending to vent), a single pale stripe from snout up to the shoulder (vs. 3–4 bright stripes from snout and behind the eye up to the shoulders); ***S. ponticeriana*:** snout shorter ES 54.7–57.4% of HW (vs. longer, ES 61.5–68.1% of HW), throat-fan shorter ADW 28.3–29.2% of AG (vs. longer, ADW 31.1–54.7% of AG), femur shorter FEL 70.6–75.3% of TBL (vs. longer, FEL 80.0–84.8% of TBL), number of ventral scales 87–89 (vs. 65–69), breeding-males with bleached orange colour patch (vs. bright red colour patch); ***Sitana sivalensis* complex:** throat-fan extending up to the chest (vs. not extending to the level of the axilla), foot longer FOL 158.9–159.8 of HL (vs. shorter, FOL 120.0–144.3% of HL).

**Description.** (based on holotype, WHT 1434A). An adult male, 45.0 mm SVL; head moderately large (HL 28.7% of SVL), elongate (HW 60.6% of HL), narrow (HW 17.4% of SVL), distinct from neck; snout short (ES 57.4% of HW); snout length greater than eye diameter (ED 75.0% of ES); interorbital distance broad (IO 14.9% of HL); eye large (ED 26.1% of HL); pupil rounded; ear-opening shallow, its greatest diameter being dorsoventrally, ear-opening with enlarged unkeeled scales anteriorly but not posteriorly, tympanum smaller than orbit (TYD 35.3% of ED); no spines above the tympanum but an enlarged keeled scale above, separated from the tympanum by two smaller rows of scales; diameter of eyes greater than eye to ear distance (ED 117.0% of TYE); forehead concave; scales on snout keeled, smaller in size than those of the occipital region; scales on interorbital and supercilium area strongly keeled; no nuchal or dorsal crest; rostral scale width greater than height, ventro-posteriorly in contact with the first supralabial, in contact posteriorly with the prenasal and three postrostral scales which are unequal in size; two supranasals on each side, two postnasals among all approximately of equal size and one prenasal; nostril rounded and located in the middle of an undivided nasal plate; two postnasals border the nasal, the upper one

larger; *canthus rostralis* and superciliary edges sharp; parietal plate lozenge shaped (anterior sides shorter than posterior sides) including a grey-blue coloured "pineal eye", parietal plate larger than adjacent plates. Mental pentagonal, its width and length approximately equal, posteriolaterally in contact with two enlarged postmentals separated by a smaller scale preventing contact between them; each postmental pair bordered posteriorly by three (left side) and four (right side) smooth scales including the medial scale, but exclusive of infralabial. Throat-fan small, its posterior scales not extending to mid venter (DWL 56.3% of SVL, ADW 29.1% of AG), margin of the anterior part of the throat-fan covered with smooth, overlapping, bluntly pointed scales, posterior part (from the middle of the throat to the midventer) with elongate, lanceolate bluntly pointed, keeled scales; throat scales elongate, smooth and overlapping; three scale rows separate orbit from supralabials; supralabials 7 (6$^{th}$ located in mid orbit position); infralabials 8, decreasing in size towards gape; scales on the throat-fan smooth but adjacent ventral scales keeled and mucronate, overlapping.

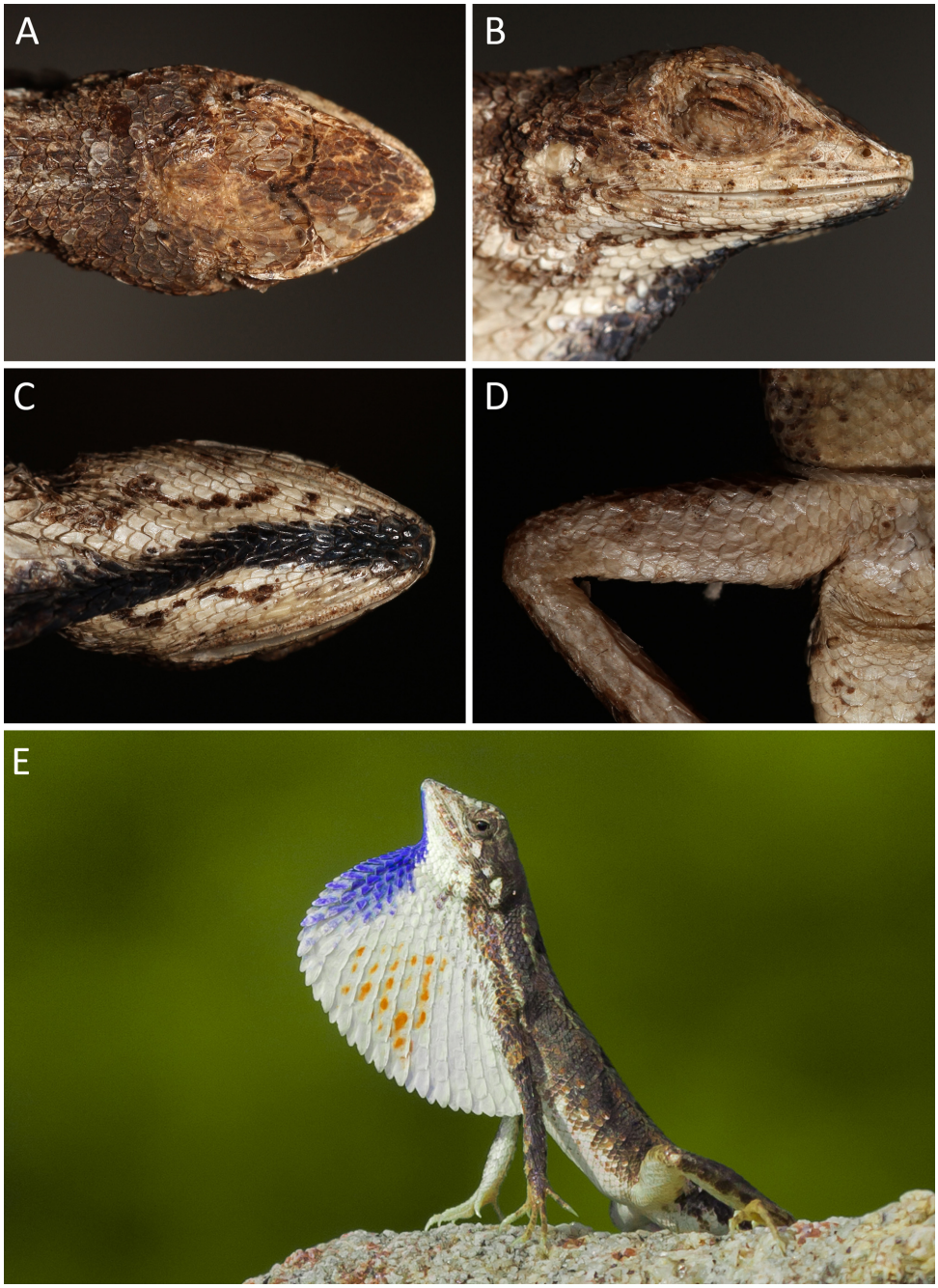


**FIGURE 1.** *Sitana bahiri* **sp. nov.** holotype (WHT 1434A) (**A)** dorsal view of head; (**B)** lateral view of head; (**C)** ventral view of head; (**D)** ventral view of thigh and tail base (photo: M.C. De Silva); (**E**) *Sitana bahiri* **sp. nov.** live breeding male (not collected) with expanded throat-fan at Kumana National Park, Sri Lanka (photo: H. Matarage in 2011).

**FIGURE 2.** *Sitana bahiri* **sp. nov.** live breeding male (not collected) with contracted throat-fan at Kirinda, Sri Lanka (photo: A.A.T. Amarasinghe in 2005).

Body slender (AG 44.8% of SVL); mid dorsal scales enlarged, equal, keeled, not elongate with pointed dorsal scales at midbody, keels straight, forming longitudinal, continuous parallel ridges; scales on dorsum at midbody larger in size than those of venter at the same level; lateral body scales unequal, irregular, keeled, mucronate, smaller than dorsals and with randomly distributed enlarged and mucronate keeled scales; upper dorsolateral scales directed upwards and backwards, dorsoventral ones directed downwards and backwards; 48 scales around midbody; pectoral scales enlarged, elongate and keeled; abdominal scales not enlarged, keeled, and bluntly-pointed; ventral keels forming regular and parallel continuous ridges; no preanal or femoral pores. Ventrals, 87.

Upper arm shorter than lower arm (UAL 16.5% of SVL; LAL 18.8% of SVL); femur shorter than tibia (FEL 25.2% of SVL; TBL 35.6% of SVL; FEL 70.6% of TBL). Dorsal scales on fore and hind limbs enlarged, elongate, keeled, overlapping, and mucronate; ventral scales on upper and lower arm enlarged, keeled, overlapping, and bluntly ended; scales on dorsal and ventral surface of thigh slightly keeled, overlapping and bluntly ended; keels on dorsal and ventral arm and foot forming a series of continuous parallel ridges. Digits elongate, slender, all bearing slightly recurved claws; claws are sharp and elongate; subdigital lamellae entire and tri-mucronate, subdigital lamellae on the toe III, 16 and toe IV, 25; inter-digital webbing absent; relative length of fingers 3 > 4 > 5 > 2 > 1, and toes 4 > 3 > 2 > 1.

Tail incomplete (broken); tail base swollen, ventral scales on tail base rounded and keeled; dorsal scales on tail keeled, elongate, overlapping, directed backwards, keels forming continuous parallel ridges; tail with subcaudals on median row not enlarged, keeled, and overlapping.

**Colour in preserved specimen.** Dorsum dark brown with a darker brown patch on the neck but no rhomboid markings on the back. Light coloured blotches on lateral sides of the body, white coloured, incomplete cross bars on the tail beginning just behind the hind limbs, broken tail with seven cross bars. A persian blue stripe starts from

mental and continues up to middle of dewlap along mid ventral line. Dark brown blotches on the lateral throat while venter, labials and tympanum are white in colour.

**Colour in life.** Based on the specimen in Fig. 2 (not collected). Dorsal surfaces of head and back cream to light greyish brown with five black-edged rhomboidal spots, the back is bordered on each side with a dark brownish band, along the middle of the back with a light vertebral line separating them. Upper and lower lips light buff cream with dark markings. A buff light cream streak from the nasal across the tympanum to the forelimb; pupil black. Iris black with its outer rim golden. A brownish-black patch on anterior part of interorbital. Anterior part of the throat-fan is persian blue and cream. A bleached orange diffuse patch at the middle of the throat-fan on a cream coloured background. Upper arm with one, lower arm with three, thigh with two and tibia with three indistinct buff cream bands. Vague, light patches on flank and lateral body. Middle of throat dark blue. Tail with 16 light cross-bands. Three buff cross-bands on fingers and three or four on toes. Ventral scales buff cream. See the following corresponding figures in Manthey (2010: 154): RA04169-4 (Pottuvil), RA04170-4 (Ampara).

**Variation in male paratypes.** Rostral scale in contact posteriorly with postrostral scales in WHT 7377; eight supralabials in male paratypes (WHT 7377, 0206C–D, 0619, 1434B, and ZMH R06344); seven infralabials in WHT1434B; 52 and 56 scales around the midbody in WHT7377 and WHT1434B respectively; subdigital lamellae on the toe III, 17 and 14 respectively, on toe IV, 26 and 23 respectively. Ventrals respectively 89 and 86.

**Description of female.** (Based on paratype WHT195A). An adult female, 46.9 mm SVL; head moderately large (HL 27.3% of SVL), elongate (HW 65.2% of HL), narrow (HW 17.8% of SVL), distinct from neck; snout short (ES 51.8% of HW); snout length greater than eye diameter (ED 75.9% of ES); interorbital distance broad (IO 16.4% of HL); eye large (ED 26.4% of HL); pupil rounded; ear-opening shallow, its greatest diameter dorsoventrally, ear-opening with enlarged unkeeled scales anteriorly but not posteriorly, tympanum smaller than orbit (TYD 39.6% of ED); no spines above the tympanum but an enlarged keeled scale above the tympanum separated from the tympanum by two smaller scale rows; diameter of eye greater than eye to ear distance (ED 111.9% of TYE); forehead concave; scales on snout keeled, smaller in size than those of the occipital region; scales on interorbital and supercilium area keeled; no nuchal or dorsal crest; rostral scale width greater than height, ventro-posteriorly in contact with the first supralabial, in contact posteriorly with the prenasals and three postrostral scales unequal in size; two supranasals around nostrils on each side, nostril rounded located in the middle of an undivided nasal plate; *canthus rostralis* and superciliary edges sharp; parietal plate lozenge shaped (anterior sides shorter than posterior sides) including a grey-blue coloured "pineal eye", parietal plate larger than adjacent plates. Mental pentagonal, approximately equal in length and width, posteriolateraly in contact with two enlarged postmentals separated by a smaller scale with no contact between them. Throat-fan absent; throat scales elongate, smooth and overlapping; three scale rows separate orbit from supralabials; supralabials 7 ($6^{th}$ situated in mid orbit position); infralabials 9, decreasing in size towards gape; gular scales keeled.

Body slender (AG 45.4% of SVL); mid dorsal scales equal sized, keeled, not elongate with pointed dorsal scales at midbody, keels straight, forming longitudinal, continuous parallel ridges; scales on dorsum at midbody of similar size than those of venter at same level; lateral body scales unequal, irregular, keeled, mucronate, short, similar in size to dorsals and with randomly distributed, enlarged, rounded, keeled scales; upper dorsolateral scales directed upwards and backwards, dorsoventral ones directed downwards and backwards; 57 scales around the midbody; pectoral scales enlarged, keeled, mucronate and weakly overlapping; abdominal scales elongate and pointed; ventral keels forming regular and parallel continuous ridges; no preanal or femoral pores. Ventrals, 88.

Upper arm shorter than lower arm (UAL 13.3% of SVL; LAL 16.7% of SVL); femur shorter than tibia (FEL 25.3% of SVL; TBL 31.0% of SVL; FEL 81.5% of TBL). Dorsal scales on fore and hind limbs enlarged, elongate, keeled, overlapping, and mucronate; ventral scales on upper and lower arm not enlarged, keeled, overlapping, and bluntly ended; scales on dorsal and ventral surface of thigh slightly keeled, overlapping and bluntly ended; keels on dorsal and ventral arm and foot forming a series of continuous parallel ridges. Digits elongate, slender, all bearing slightly recurved claws; claws are sharp and elongate; subdigital lamellae entire and tri-mucronate, 14 subdigital lamellae on the toe III, and 24 on toe IV; inter-digital webbing absent; relative length of fingers 3 > 4 > 5 > 2 > 1, and toes 4 > 3 > 2 > 1.

Tail incomplete (broken); tail base swollen, ventral scales on tail base rounded and keeled; dorsal scales on tail keeled, elongate, overlapping, directed backwards, keels forming continuous parallel ridges; tail with subcaudals on median row not enlarged, slightly keeled, overlapping.

**Etymology.** The species epithet is an eponym Latinised in the genitive singular, honouring Mohomed Mujythaba Bahir for his generous friendship, and remarkable contributions to Sri Lankan herpetology, carcinology

and biodiversity conservation. Currently he spends his valuable time promoting science, biodiversity and conservation to the general public, especially the younger generation. Suggested English name: Bahir's Fan-throated Lizard; Sinhala (local) name: Bahirgë Theli Katussa; French name: Sitane de Bahir.

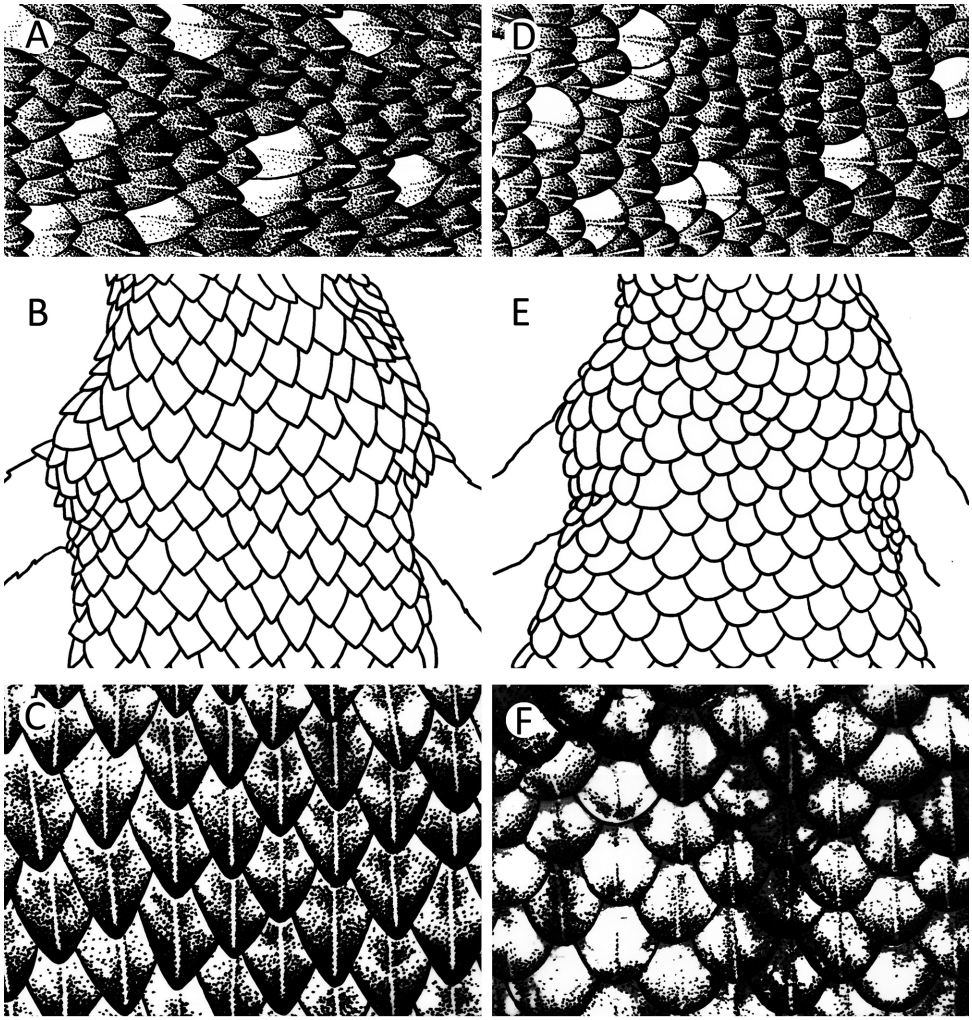


**FIGURE 3.** *Sitana bahiri* **sp. nov.** (**A**) lateral body scales of holotype male (WHT 1434A); (**B**) pectoral scales and (**C**) abdominal scales of paratype female (WHT 0195A); *Sitana devakai* **sp. nov.** (D) lateral body scales of holotype male (WHT 0111E); (**E**) pectoral scales and (**F**) abdominal scales of paratype female (WHT 0111C) (illustrated by A.A.T. Amarasinghe).

**Distribution.** See map Fig. 9. Drier coastal areas in south-eastern Sri Lanka, sometimes recorded within the country at a distance of ~20 km from the nearest beach (e.g. Tissamaharama).

**Natural history.** We observed live specimens in warm, lowland habitats but the species was most abundant in the drier coastal areas (Fig. 10), under open scrub jungles on dusty or sandy ground in the dry zone or drier parts of the intermediate zone. *S. bahiri* **sp. nov.** has never been recorded from the wet zone or its adjacent habitats. Most of its habitats were covered with tree species such as *Manilkara hexandra* (Sapotaceae), *Drypetes sepiaria* (Euphorbiaceae), and some shrubs such as *Salvadora persica* (Salvadoraceae), *Dodonaea viscosa* (Sapindaceae), *Spinifex littoreus* (Poaceae), *Ziziphus oenopila* (Rhamnaceae), *Catunaregam spinosa* (Rubiaceae), *Ipomoea asarifolia* (Convolvulaceae), *Spermacoce hispida* (Rubiaceae), *Gisekia pharnaceoides* (Molluginaceae), *Tephrosia purpurea* (Fabaceae), and *Portulaca oleracea* (Portulacaceae).

*Sitana bahiri* **sp. nov.** is a diurnal lizard fully adapted to harsh terrestrial habits such as dry sandy coasts. In the morning, around 0700–0800 h it mostly lies on rocks, fallen logs or shrubs, and as it warms up, it becomes active and begins its search for food. In the middle of the day, when it is hottest, it tends to hide inside small shrubs. We observed some individuals digging small sand pits near the root of the shrub in order to escape the heat. There is an annual temperature of between 30 ºC and 35 ºC (mean 32 ºC), while the humidity varies between around 40–50% (mean 45%).

**TABLE 1.** A comparison of morphometric and meristic characters of male specimens of *Sitana ponticeriana*, *S. deccanensis*, *S. bahiri* **sp. nov.**, and *S. devakai* **sp. nov.** based on examined materials.

| character | Males | | | |
|---|---|---|---|---|
| | *S. ponticeriana* (n=3) | *S. deccanensis* (n=2) | *S. bahiri* **sp. nov.** (n=5) | *S. devakai* **sp. nov.** (n=5) |
| SVL | 48.0–49.0 | 60.0–67.7 | 40.5–45.0 | 40.0–45.6 |
| AG | 18.1–20.7 | 27.9–30.8 | 19.4–20.2 | 14.9–21.0 |
| HL | 12.4–14.3 | 17.7–19.4 | 12.2–12.9 | 11.1–12.9 |
| HW | 8.3–9.0 | 11.8–12.1 | 7.6–7.8 | 6.2–7.7 |
| HD | 6.8–7.0 | 9.2–9.3 | 5.6–6.5 | 3.9–6.0 |
| TYE | 3.7–4.0 | 4.8–5.1 | 2.9–3.0 | 1.9–2.8 |
| TYD | 1.2–1.6 | 1.8–2.4 | 1.1–1.2 | 0.6–3.2 |
| ED | 3.7–4.3 | 5.8–5.9 | 3.4 | 3.4–4.6 |
| EN | 3.2–3.7 | 3.8–4.2 | 2.7–2.8 | 2.2–2.6 |
| ES | 5.3–5.8 | 6.3–6.4 | 4.2–4.5 | 3.6–4.5 |
| IN | 2.2–3.1 | 2.6–2.7 | 1.8–2.1 | 2.2–2.4 |
| IO | 2.5–3.4 | 3.9–5.2 | 1.8–1.9 | 0.6–1.7 |
| DWL | 25.1–31.3 | 39.2–47.7 | 24.2–25.4 | 23.3–27.5 |
| ADW | 9.6–10.3 | 15.5–16.8 | 5.6–5.9 | 4.5–6.7 |
| FEL | 13.1–13.9 | 15.7–17.9 | 11.0–11.3 | 10.5–12.1 |
| TBL | 15.9–16.5 | 19.7–21.6 | 14.6–16.1 | 14.2–16.8 |
| FOL | 21.6–21.9 | 25.6 | 19.6–20.6 | 19.6–21.9 |
| UAL | 9.0–9.8 | 10.6–13.2 | 7.4–7.5 | 5.6–8.6 |
| LAL | 7.9–8.2 | 11.1–13.4 | 7.0–8.5 | 6.8–8.3 |
| TBW | 4.9–6.3 | 5.3–6.1 | 3.8–4.6 | 3.3–4.7 |
| SUP | 8–10 | 12 | 7–8 | 8–9 |
| MBS | 50–54 | 66–70 | 49–56 | 57–59 |
| VEN | 65–69 | 83–92 | 86–89 | 100–108 |
| SDL on T3 | 11–15 | 13 | 14–17 | 15–16 |
| SDL on T4 | 20–24 | 19–23 | 23–26 | 21–23 |

**TABLE 2.** External morphological character variation in *Sitana ponticeriana*, *S. deccanensis*, *S. bahiri* **sp. nov.**, and *S. devakai* **sp. nov.** based on examined male specimens.

| Character | *S. ponticeriana* | *S. deccanensis* | *S. bahiri* **sp. nov.** | *S. devakai* **sp. nov.** |
|---|---|---|---|---|
| Pectoral scales | enlarged | not enlarged | enlarged | enlarged |
| Abdominal scales in males | rounded | bluntly-pointed | bluntly-pointed | pointed |
| Abdominal scales in females | — | — | pointed | rounded |
| Lateral body scales | unequal, irregular, mucronate | equal, regular, mucronate | unequal, irregular, mucronate | equal, regular, rounded |
| Enlarged scales among lateral body scales | present | absent | present | present |
| Red colour patch on throat-fan | bright red, middle of the fan | bright red, extends until vent along belly | bleached orange, middle of the fan | bright red, middle of the fan |
| Black colour patch on throat-fan | present | present | absent | present |
| Enlarged scales above tympanum | present | absent | present | present |

**TABLE 3.** A comparison of morphometric and meristic characters between the Sri Lanka species: *S. bahiri* **sp. nov.** and *S. devakai* **sp. nov.** based on examined specimens; NA, not applicable.

| character | males | | females | |
|---|---|---|---|---|
| | *Sitana bahiri* **sp. nov.** (n=5) | *Sitana devakai* **sp. nov.** (n=5) | *Sitana bahiri* **sp. nov.** (n=4) | *Sitana devakai* **sp. nov.** (n=3) |
| SVL | 40.5–45.0 | 40.0–45.6 | 44.1–46.9 | 42.0–44.9 |
| AG | 19.4–20.2 | 14.9–21.0 | 21.3–21.9 | 19.6–20.5 |
| HL | 12.2–12.9 | 11.1–12.9 | 12.8–12.9 | 12.2–12.7 |
| HW | 7.6–7.8 | 6.2–7.7 | 7.9–8.3 | 7.2–7.9 |
| HD | 5.6–6.5 | 3.9–6.0 | 5.8–6.0 | 4.8–5.4 |
| TYE | 2.9–3.0 | 1.9–2.8 | 1.2–3.0 | 2.8–3.2 |
| TYD | 1.1–1.2 | 0.6–3.2 | 1.3–1.6 | 1.0–1.5 |
| ED | 3.4 | 3.4–4.6 | 3.4–3.6 | 4.1–4.7 |
| EN | 2.7–2.8 | 2.2–2.6 | 2.6–2.9 | 2.3–2.5 |
| ES | 4.2–4.5 | 3.6–4.5 | 1.8–1.9 | 4.1–4.7 |
| IN | 1.8–2.1 | 2.2–2.4 | 2.1–2.5 | 2.3–2.4 |
| IO | 1.8–1.9 | 0.6–1.7 | 2.1–2.4 | 1.2–1.6 |
| DWL | 24.2–25.4 | 23.3–27.5 | NA | NA |
| ADW | 5.6–5.9 | 4.5–6.7 | NA | NA |
| FEL | 11.0–11.3 | 10.5–12.1 | 11.9–12.8 | 10.6–11.6 |
| TBL | 14.6–16.1 | 14.2–16.8 | 14.6–15.7 | 14.4–15.2 |
| FOL | 19.6–20.6 | 19.6–21.9 | 18.1–19.5 | 17.6–20.0 |
| UAL | 7.4–7.5 | 5.6–8.6 | 6.2–7.2 | 8.1–8.8 |
| LAL | 7.0–8.5 | 6.8–8.3 | 7.8 | 7.6–7.7 |
| TBW | 3.8–4.6 | 3.3–4.7 | 5.0–5.1 | 3.7–4.2 |
| SUP | 7–8 | 8–9 | 7–8 | 8–9 |
| MBS | 49–56 | 57–59 | 53–57 | 55–59 |
| VEN | 86–89 | 100–108 | 85–88 | 72–76 |
| SDL on T3 | 14–17 | 15–16 | 14–15 | 14–15 |
| SDL on T4 | 23–26 | 21–23 | 24–25 | 24–25 |

*Sitana bahiri* **sp. nov.** is a highly territorial animal and shows similar territorial behaviour pattern to *Otocryptis* (see Karunarathna & Amarasinghe 2008). Before combat (attacking stage) and prior to mating, they extend and stretch their throat-fans very quickly (about 4–6 times per second). Simultaneously, they swivel their heads and open their dark blue coloured mouths in a threat pose to their male opponents. During combat (struggling stage), they mostly use their hind limbs to kick at their opponent. Most often the territorial fighting involved a certain amount of harsh savagery (savaging stage), and the animals often end up with wounded body parts, with particular damage to the face, limbs and posterior body parts.

They mostly feed on ground dwelling insects, but have also been observed predating on airborne dragonflies, butterflies, and caterpillars. Their diet also includes tiny terrestrial crabs. During the night, they sleep on the sandy floor, lower branches or on the roots of shrubs. *Eutropis carinata* (grass skink), *Calotes versicolor* (garden lizard), *Lycodon aulicus* (wolf snake), *Coelognathus helena* (trinket snake), *Varanus bengalensis* (land monitor), *Herpestes brachyurus* (brown mongoose), *Acridotheres tristis* (common myna), and several birds of prey are observed as their major predators. Egg laying occurs from August to October and they lay 4–6 eggs per clutch in a nest dug in cool habitats under shrubs.

**Conservation status.** The result of the application to the IUCN Red List (2013) criteria B2-b (iii) indicates that *S. bahiri* **sp. nov.** is Vulnerable (VU). It is restricted to an area of occupancy (AOO) <650 km$^2$ (7 spotting sites) with an extent of occurrence (EOO) <8,500 km$^2$ in the south-east dry zone within different forested areas. In April

2004, we conducted a 5x100m belt transect search along the coast, which was ~75% covered with *Spinifex littorus* (Fig. 10), 44 *S. bahiri* specimens (12 males and 32 females) were recorded. Among them 13 were juveniles and subadults. The same location was surveyed again in April 2008 using a 5x100m belt transect, this time *Spinifex littorus* cover was reduced to ~10% and only 6 specimens (1 male and 5 females) were recorded. This density has shown a definite decrease due to the Indian Ocean Sumatra–Andaman earthquake and the subsequent tsunami which followed (it flushed away 1–2 km of the land) in December 2004.

### ***Sitana devakai*** **sp. nov. Amarasinghe, Ineich & Karunarathna**

(Figs. 3, 4; Tables 1–3)

*Litana Ponticereana* [sic]—Kelaart (1854) [*partim*].
*Sitana ponticeriana*—Smith (1935) [*partim*]; Taylor (1957) [*partim*]; Wermuth (1967) [*partim*]; Manamendra-Arachchi & Liyanage (1994) [*partim*]; Erdelen (1998) [*partim*]; Das & de Silva (2005) [*partim*]; de Silva (2006) [*partim*]; Somaweera & Somaweera (2009) [*partim*]; Manthey (2010) [*partim*].
*Sitana ponticeriana ponticeriana*—Deraniyagala (1953) [*partim*].
*Sitana ponticertiana* [sic]—Bahir & Surasinghe (2005) [*partim*].

**Holotype.** Male, WHT 0111E, SVL 45.6 mm, collected at Nagagamuwa-Puttalam, Sri Lanka (8°10′N, 79°50′E), alt. 2 m, by K. Manamendra-Arachchi & D. Gabadage, 9 October 1993.

**Paratypes.** Males, WHT 0174A–B, respective SVL 41.1 mm and 40.0 mm, collected at Palavi-Puttalam, Sri Lanka; Male, WHT 1417, SVL 43.9 mm, collected at Angamuwewa-Rajanganaya, Sri Lanka; Male, WHT 1424A, SVL 39.9 mm, collected at Mundel-Puttalam, Sri Lanka; Female, WHT0174C, SVL 42.7 mm, collected at Palavi-Puttalam, Sri Lanka; Females, WHT 0111B–C, respective SVL 42.0 mm and 44.9 mm, collected at Nagagamuwa-Puttalam, Sri Lanka; Sub adult male, WHT 1424B, SVL 38.6 mm, collected at Mundel-Puttalam, Sri Lanka; Sub adult females, WHT 0111A,D, respective SVL 37.6 mm and 38.1 mm, collected at Nagagamuwa-Puttalam, Sri Lanka. All those specimens were collected by D. Gabadage.

**Diagnosis for adult males.** *Sitana devakai* **sp. nov.** differs from each congener by having the following characters: ***S. bahiri*** **sp. nov.**: longer throat-fan ADW 29.9–32.5% of AG (vs. shorter, ADW 28.3–29.2% of AG), midbody scale rows 57–59 (vs. 49–56), ventral scale number 100–108 (vs. 87–89), abdominal scales pointed (vs. bluntly pointed), equal and regular lateral scales with intermediate enlarged scales (vs. unequal and irregular lateral scales with intermediate enlarged scales), breeding-males with bright red colour patch (vs. bleached orange colour patch); **S. *deccanensis*:** smaller SVL 40.0–45.6 mm (vs. larger SVL above 60.0 mm), snout longer ES 57.2–63.2% of HW (vs. shorter, ES 53.1–53.4% of HW), throat-fan shorter ADW 29.9–32.5% of AG (vs. longer, ADW 50.3–60.2% of AG), femur shorter FEL 72.2–78.4% of TBL (vs. longer, FEL 79.7–82.9% of TBL), foot longer FOL 154.7–180.2 of HL (vs. shorter, FOL 131.9–144.6% of HL), supralabials 8–9 (vs. 12), midbody scale rows 57–59 (vs. 66–70), ventral scale number 100–108 (vs. 82–92), subdigital lamellae on toe III 15–16 (vs. 13), enlarged scales above the tympanum present (vs. absent), lateral scales with intermediate enlarged scales (vs. without enlarged scales), breeding-males with bright red colour patch restricted to mid throat-fan (vs. bright red patch extending to vent), single pale stripe running from the snout up to the shoulder (vs. 3–4 bright stripes from snout and behind the eye up to the shoulders); ***S. ponticeriana*:** femur shorter FEL 72.2–78.4% of TBL (vs. longer, FEL 80.0–84.8% of TBL), ventral scale number 100–108 (vs. 65–69), abdominal scales pointed (vs. rounded); ***Sitana sivalensis*** **complex:** throat-fan extending up to the chest (vs. not extending to the level of axilla), foot longer with FOL 154.7–180.2 of HL (vs. shorter, FOL 120.0–144.3% of HL).

**Description.** (Based on holotype, WHT 0111E). An adult male, 45.6 mm SVL; head moderately large (HL 27.9% of SVL), elongate (HW 60.0% of HL), narrow (HW 16.7% of SVL), distinct from neck; snout short (ES 58.9% of HW); snout length somewhat greater than eye diameter (ED 98.0% of ES); interorbital distance broad (IO 11.7% of HL); eye large (ED 34.7% of HL); pupil rounded; ear-opening shallow, its greatest diameter located dorsoventrally, ear-opening with enlarged, unkeeled scales, tympanum smaller than orbit (TYD 60.6% of ED); no spines above the tympanum but an enlarged keeled scale above the tympanum separated from the tympanum by two smaller scale rows; diameter of eyes greater than eye to ear distance (ED 168.7% of TYE); forehead concave; scales on snout keeled, smaller in size than those of the occipital region; scales on interorbital and supercilium area keeled; no nuchal or dorsal crest; rostral scale width greater than height, ventro-posteriorly in contact with the first

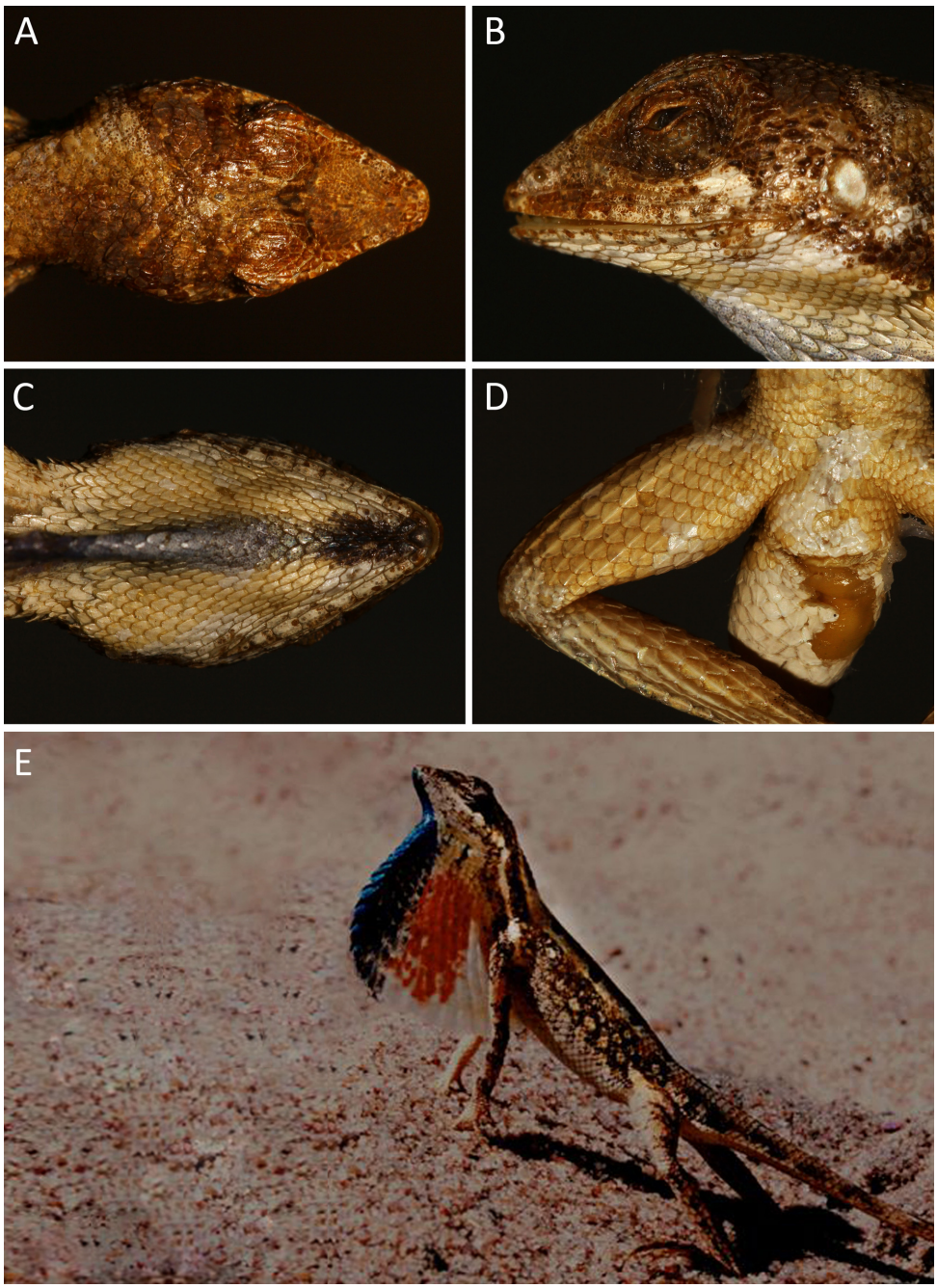


**FIGURE 4.** Holotype male WHT 0111E of *Sitana devakai* **sp. nov.**, (**A)** dorsal head view; (**B)** lateral head view; (**C)** ventral head view; (**D)** ventral thigh and tail base (photo: M.C. De Silva); (**E**) *Sitana devakai* **sp. nov.**, live breeding male with expanded throat-fan (not collected) at Wilpaththu National Park, Sri Lanka (photo: V. Weeratunge).

supralabial, in contact posteriorly with the prenasal and three postrostral scales unequal in size; two supranasals, on each side of the nostrils, three postnasals approximately equal in size and one prenasal; nostril rounded and located in the middle of an undivided nasal plate; three postnasals bordering the nasal, the middle one largest; *canthus rostralis* and superciliary edges sharp; parietal plate lozenge shaped (anterior sides shorter than posterior sides) including a grey-blue coloured "pineal eye", parietal plate larger than adjacent plates. Mental pentagonal, width and length of which approximately equal, posteriolaterally in contact with two enlarged postmentals separated by a smaller scale preventing contact between them; each postmental pair bordered posteriorly by three (left side) and four (right side) smooth scales including the medial scale, but exclusive of infralabials. Throat-fan small, posterior scales do not extend to mid venter (DWL 60.3% of SVL, ADW 32.1% of AG), margin of the anterior part of the throat-fan covered with keeled, overlapping, bluntly pointed scales, posterior part (from the middle of the throat to the midventer) with long, elongate lanceolate bluntly pointed scales; throat scales elongate, keeled and

overlapping; three scale rows separating orbit from supralabials; supralabials 8 (6th in mid orbit position); infralabials 9, decreasing in size towards gape; scales on the throat-fan and adjacent ventral scales keeled and mucronate, overlapping.

Body slender (AG 50.0% of SVL); mid dorsal scales equal, keeled, not elongate with pointed dorsal scales at midbody, keels straight, forming longitudinal continuous parallel ridges; scales on dorsum at midbody larger in size than those of venter at the same level; lateral body scales unequal, keeled, rounded, smaller than dorsals and with randomly distributed enlarged, rounded, keeled scales; upper dorsolateral scales directed upwards and backwards, dorsoventral ones directed downwards and backwards; 59 scale rows around midbody; pectoral scales enlarged, elongate and keeled; abdominal scales not enlarged, short, mucronate and keeled; ventral keels forming regular and parallel continuous ridges; no preanal or femoral pores. Ventrals 105.

Upper arm somewhat longer than lower arm (UAL 18.9% of SVL; LAL 18.1% of SVL); femur shorter than tibia (FEL 26.5% of SVL; TBL 36.7% of SVL; FEL 72.2% of TBL). Dorsal scales on fore and hind limbs enlarged, elongate, keeled, overlapping, and mucronate; ventral scales on upper and lower arm enlarged, slightly keeled, overlapping, and blunt ended; scales on dorsal and ventral surface of thigh and shank enlarged, keeled, overlapping and blunt ended; keels on dorsal and ventral arm and foot forming a series of continuous parallel ridges. Digits elongate, slender, all bearing slightly recurved claws; claws are sharp and elongate; subdigital lamellae entire and tri-mucronate, 16 subdigital lamellae on toe III and 23 on toe IV; inter-digital webbing absent; relative length of fingers 3 > 4 > 5 > 2 > 1, and toes 4 > 3 > 2 > 1.

Tail complete (125.8 mm) and base swollen, ventral scales on tail base rounded and keeled; dorsal scales on tail keeled, elongate, overlapping, directed backwards, keels forming continuous parallel ridges; tail with subcaudals on median row not enlarged, slightly keeled, overlapping.

**Colour in preserved specimen.** Dorsum light brown, darker brown patch on the neck, five rhomboid markings on the back. Light coloured blotches on lateral sides of the body, white coloured incomplete cross bars on the tail beginning just behind the hind limbs, a persian blue stripe runs from mental and continues up to mid dewlap point along mid ventral line.

**Colour in life.** Based on the specimen in Fig. 4. Upper head and back dorsally cream to yellowish brown with five black-edged rhomboidal spots, the back is bordered on each side with a dark brownish band, a light vertebral line along the middle of the back separating them. Upper and lower lip a light buff cream with dark markings. A buff light cream streak from the nasal across the tympanum to the forelimb; pupil black. Iris black with a golden outer rim; reddish-brown patch on anterior part of interorbital. Anterior part of the throat-fan is persian blue, black and cream. A bright red coloured patch at the middle of the throat-fan on the cream coloured background during the breeding season. Upper arm, lower arm, thigh and tibia all with three indistinct buff cream bands. Vague, light patches on flank and lateral body. Tail with 20 light cross-bands. Three buff cross-bands on fingers and three or four on toes. Ventral scales buff cream. See the following corresponding figures in Manthey (2010: 154): RA04168-4 (Wiplattu NP).

**Variation in male paratypes.** Nine supralabials in paratypes WHT 0174A–B and WHT 1424A; respectively 57, 58, and 58 scales around midbody in WHT 1417, WHT 0174B, and WHT 1424A; subdigital lamellae on the toe III, 15 in all other male paratypes, on toe IV, 21 (WHT 1417) and 22 (WHT 0174A and WHT 1424A). Ventrals respectively 100, 101, 102, and 108 (WHT 1424, WHT 0174B, WHT 1417, and WHT 0174A).

**Description of female.** (Based on paratype WHT 0111C). An adult female, 44.9 mm SVL; head moderately large (HL 28.3% of SVL), elongate (HW 61.9% of HL), narrow (HW 17.5% of SVL), distinct from neck; snout short (ES 59.5% of HW); snout length approximately equal to the eye diameter (ED 99.6% of ES); interorbital distance broad (IO 12.1% of HL); eye large (ED 36.7% of HL); pupil rounded; ear-opening shallow, its greatest diameter being dorsoventral, ear-opening with enlarged keeled scales, tympanum smaller than orbit (TYD 31.2% of ED); no spines above the tympanum but an enlarged keeled scale above the tympanum separated from the tympanum by three smaller scale rows; diameter of eyes greater than eye to ear distance (ED 166.2% of TYE); forehead concave; scales on snout keeled, more or less similar in size than those of the occipital region; scales on interorbital and supercilium area keeled; no nuchal or dorsal crest; rostral scale width greater than height, ventro-posteriorly in contact with first supralabial, in contact posteriorly with the prenasal and three postrostral scales unequal in size; two supranasals around nostrils on each side, three postnasals with the middle one larger; nostril rounded located in the middle of an undivided nasal plate; *canthus rostralis* and superciliary edges sharp; parietal plate lozenge shaped (anterior sides shorter than posterior sides) including a grey-blue coloured "pineal eye",

parietal plate larger than adjacent plates. Mental pentagonal, approximately equal in length and width, posteriolaterally in contact with two enlarged postmentals separated by a smaller scale preventing contact between them. Throat-fan absent; throat scales elongate, keeled and overlapping; three scale rows separate orbit from supralabials; supralabials 8 (6$^{th}$ in mid orbit position); infralabials 10, decreasing in size towards gape; gular scales keeled.

Body slender (AG 45.7% of SVL); mid dorsal scales equal, keeled, not elongate with pointed dorsal scales at midbody, keels straight forming longitudinal, continuous, parallel ridges; lateral body scales unequal, irregular, keeled, mucronate, smaller than dorsals and with randomly distributed enlarged, rounded, keeled scales; upper dorsolateral scales directed upwards and backwards, dorsoventral ones directed downwards and backwards; 57 scales around midbody; pectoral scales not enlarged, keeled, rounded and overlapping; abdominal scales short and rounded; ventral keels forming regular and parallel continuous ridges; no preanal or femoral pores. Ventrals 74.

Upper arm longer than lower arm (UAL 19.5% of SVL; LAL 17.1% of SVL); femur shorter than tibia (FEL 25.9% of SVL; TBL 32.6% of SVL; FEL 79.4% of TBL). Dorsal scales on fore and hind limbs enlarged, elongate, keeled, overlapping, and mucronate; ventral scales on upper and lower arm enlarged, slightly keeled, overlapping, and bluntly ended; scales on dorsal and ventral surface of thigh slightly keeled, overlapping and bluntly ended; keels on dorsal and ventral arm and foot forming a series of continuous parallel ridges. Digits elongate, slender, all bearing slightly recurved claws; claws are sharp and elongate; subdigital lamellae entire and tri-mucronate, 15 subdigital lamellae on the toe III, and 25 on toe IV; inter-digital webbing absent; relative length of fingers 3 > 4 > 5 > 2 > 1, and toes 4 > 3 > 2 > 1.

Tail complete and base swollen, ventral scales on tail base rounded and keeled; dorsal scales on tail keeled, elongate, overlapping, directed backwards, keels forming continuous parallel ridges; tail with subcaudals on median row not enlarged, slightly keeled, overlapping.

**Etymology.** The species epithet is an eponym Latinised in the genitive singular, honouring Prof. Devaka Keerthi Weerakoon, for his remarkable contributions to biodiversity conservation in Sri Lanka. He worked as the Technical Advisor of the 2007 and 2012 Red Lists of Threatened Fauna and Flora in Sri Lanka and was responsible for their publication. As a consultant to the Department of Wildlife Conservation, he has provided technical support for the preparation and implementation of protected areas, produced management plans, managed alien invasive species programs in protected areas, mapped habitats, carried out protected area gap analyses programs and conducted bird surveys. His contributions to the ecology of Asian elephants and reduction of human-elephant conflicts are remarkable. Suggested English name: Devaka's Fan-throated Lizard; Sinhala (local) name: Devakagë Theli Katussa; French name: Sitane de Devaka.

**Distribution.** See map Fig. 9. Drier coastal areas in the north and north-western parts of Sri Lanka, sometimes recorded at a distance of ~10–60 km from the nearest beach (e.g. Anuradhapura, Vavuniya and Kilinochchi).

**Natural history.** Most of the occupied habitats have similar environmental conditions to those of *S. bahiri* **sp. nov.**, comprising the following species of trees: *Ziziphus rugosa* (Rhamnaceae), *Manilkara hexandra* (Sapotaceae), and most of shrubs and herbs like *Abelmoschus angulosus* (Malvaceae), *Benkara malabarica* (Rubiaceae), *Carissa spinarum* (Apocynaceae), *Hydrophylax maritima* (Rubiaceae), *Capparis zeylanica* (Capparaceae), *Spinifex littoreus* (Poaceae), *Canthium coromandelicum* (Rubiaceae), *Salvadora persica* (Salvadoraceae), *Calotropis gigantea* (Apocynaceae), *Sesuvium portulacastrum* (Aizoaceae), *Indigofera linnaei* (Fabaceae), and *Opuntia monacantha* (Cactaceae).

*Sitana devakai* **sp. nov.** is a diurnal lizard completely suited to harsh terrestrial habitats such as dry sandy coasts (Fig. 10). Copulation is limited to a 5–10 second activity. Egg laying activities were observed from September to November. They lay 3–6 eggs per clutch with a mean size of 9.2 × 4.7 mm ($n$=18). The incubation period is between 40–50 days. Hatchlings always live hidden inside shrubs during the first month after hatching. *Turdoides affinis* (common babbler), *Centropus sinensis* (greater coucal), *Halcyon smyrnensis* (white-throated kingfisher), *Bubulcus ibis* (cattle egret), *Herpestes edwardsii* (grey mongoose), *Viverricula indica* (ring-tailed civet), *Varanus bengalensis* (land monitor) and *Dendrelaphis tristis* (common bronzeback snake) are their major predators. Territorial behaviours are similar to those of *S. bahiri* **sp. nov.** and *Otocryptis wiegmanni* (see Karunarathna & Amarasinghe, 2008). They also open their mouths to threaten invaders, but the mouth cavity is purple in colour (vs. *S. bahiri* **sp. nov.** blue in color). At midday when it is warm, they keep their tails erected while walking, possibly to avoid contact with the hot sandy ground. We observed strategic feeding habits such as following ants to find their nests and using "sit and wait" strategies for predation.

**Conservation status.** The result of the application of the IUCN Red List (2013) criteria B1-b (i) shows that *S. devakai* **sp. nov.** is Vulnerable (VU). It is restricted to an area of occupancy (AOO) <850 km$^2$ (11 spotting sites) and its extent of occurrence (EOO) <11,500 km$^2$ in the north and north-west dry zone within different forested areas in Sri Lanka.

### *Sitana deccanensis* Jerdon, 1870

(Figs. 5, 6, 8; Tables 1, 2, 4)

*Sitana ponticeriana deccanensis*—Deraniyagala (1953).
*Sitana minor*—Schleich & Kästle (1998), Schleich *et al*. (1998), Anders & Kästle (2002) [*partim*].
*Sitana ponticeriana*—Das & de Silva (2005) [*partim*], Manthey (2010) [*partim*].

**Syntypes.** Male, BMNH 1946.8.27.39, SVL 67.6 mm, India, presented by J. E. Gray; male, BMNH 1946.8.27.40, SVL 60.0 mm, India, presented by J. E. Gray. **Note.** We discovered the original type series of *S. deccanensis* (comprising two syntypes) among the syntypes of *S. minor* Günther, 1864 and they probably got mixed up later (probably after 1870).

**Other Specimens examined.** Males, MNHN 2568, MNHN 6903–4, respective SVL 62 mm, 69 mm, and 78 mm, "Indes Orientales", coll. Jacquemont; Male, MNHN 6023, SVL 74 mm, "Bellari (Inde)", coll. Chaper; Male, BMNH 1946.8.27.41 (now paralectotype of *S. minor*; see below), India (Madras, in error), SVL 60 mm, presented by T. C. Jerdon.

**Diagnosis for adult males.** *Sitana deccanensis* differs from each congener by having the following characters: ***S. bahiri* sp. nov.**: larger SVL above 60.0 mm (vs. smaller SVL 40.0–50.0 mm), snout shorter ES 53.1–53.4% of HW (vs. longer, ES 54.7–57.4% of HW), throat-fan longer ADW 50.3–60.2% of AG (vs. shorter, ADW 28.3–29.2% of AG), femur longer FEL 79.7–82.9% of TBL (vs. shorter, FEL 70.6–75.3% of TBL), foot shorter FOL 131.9–144.6% of HL (vs. longer, FOL 158.9–159.8 of HL), supralabials 12 (vs. 7–8), midbody scales 66–70 (vs. 49–56), subdigital lamellae on toe III 13 (vs. 14–17), subdigital lamellae on toe IV 19–23 (vs. 23–26), enlarged scales above the tympanum absent (vs. present), equal and regular lateral scales without intermediate enlarged scales (vs. unequal and irregular lateral scales with enlarged scales), breeding-males with bright red patch extending to vent (vs. bleached orange colour patch), 3–4 bright stripes from snout and behind the eye up to the shoulders (vs. a single pale stripe from snout up to the shoulder); ***S. devakai* sp. nov.**: larger SVL above 60.0 mm (vs. smaller SVL 40.0–45.6 mm), snout shorter ES 53.1–53.4% of HW (vs. longer, ES 57.2–63.2% of HW), throat-fan longer ADW 50.3–60.2% of AG (vs. shorter, ADW 29.9–32.5% of AG), femur longer FEL 79.7–82.9% of TBL (vs. shorter, FEL 72.2–78.4% of TBL), foot shorter FOL 131.9–144.6% of HL (vs. longer, FOL 154.7–180.2 of HL), supralabials 12 (vs. 8–9), midbody scale rows 66–70 (vs. 57–59), ventral scales 82–92 (vs. 100–108), subdigital lamellae on toe III 13 (vs. 15–16), enlarged scales above the tympanum absent (vs. present), lateral scales without intermediate enlarged scales (vs. with enlarged scales), breeding-males with bright red patch extending to vent (vs. bright red colour patch restricted to mid throat-fan), 3–4 bright stripes from snout and behind the eye up to the shoulders (vs. a single pale stripe from snout up to the shoulder); ***S. ponticeriana*:** larger SVL above 60.0 mm (vs. smaller SVL 48.0–49.0 mm), snout shorter ES 53.1–53.4% of HW (vs. longer, ES 61.5–68.1% of HW), throat-fan longer ADW 50.3–60.2% of AG (vs. shorter, ADW 31.1–54.7% of AG), foot shorter FOL 131.9–144.6% of HL (vs. longer, FOL 150.9–175.5% of HL), supralabials 12 (vs. 8–10), midbody scale rows 66–70 (vs. 50–54), ventral scales 82–92 (vs. 65–69), no enlarged scales above the tympanum (vs. present), equal and regular lateral scales without intermediate enlarged scales (vs. unequal and irregular lateral scales with enlarged scales), breeding-males with bright red patch extending to vent (vs. bright red colour patch restricted to mid throat-fan); ***Sitana sivalensis* complex:** larger SVL above 60.0 mm (vs. smaller SVL of 35.0–44.5 mm), throat-fan extending up to the abdomen (vs. not extending to the level of the axilla), breeding-males with bright red patch extending to vent (vs. no such red colour patch).

**Description of syntype.** (Based on BMNH 1946.8.27.39). An adult male, 67.6 mm SVL; head moderately large (HL 28.7% of SVL), elongate (HW 62.4% of HL), narrow (HW 17.9% of SVL), distinct from neck; snout short (ES 53.1% of HW); snout length somewhat greater than eye diameter (ED 91.7% of ES); interorbital distance broad (IO 20.1% of HL); eye large (ED 30.4% of HL); pupil rounded; ear-opening shallow, its greatest diameter

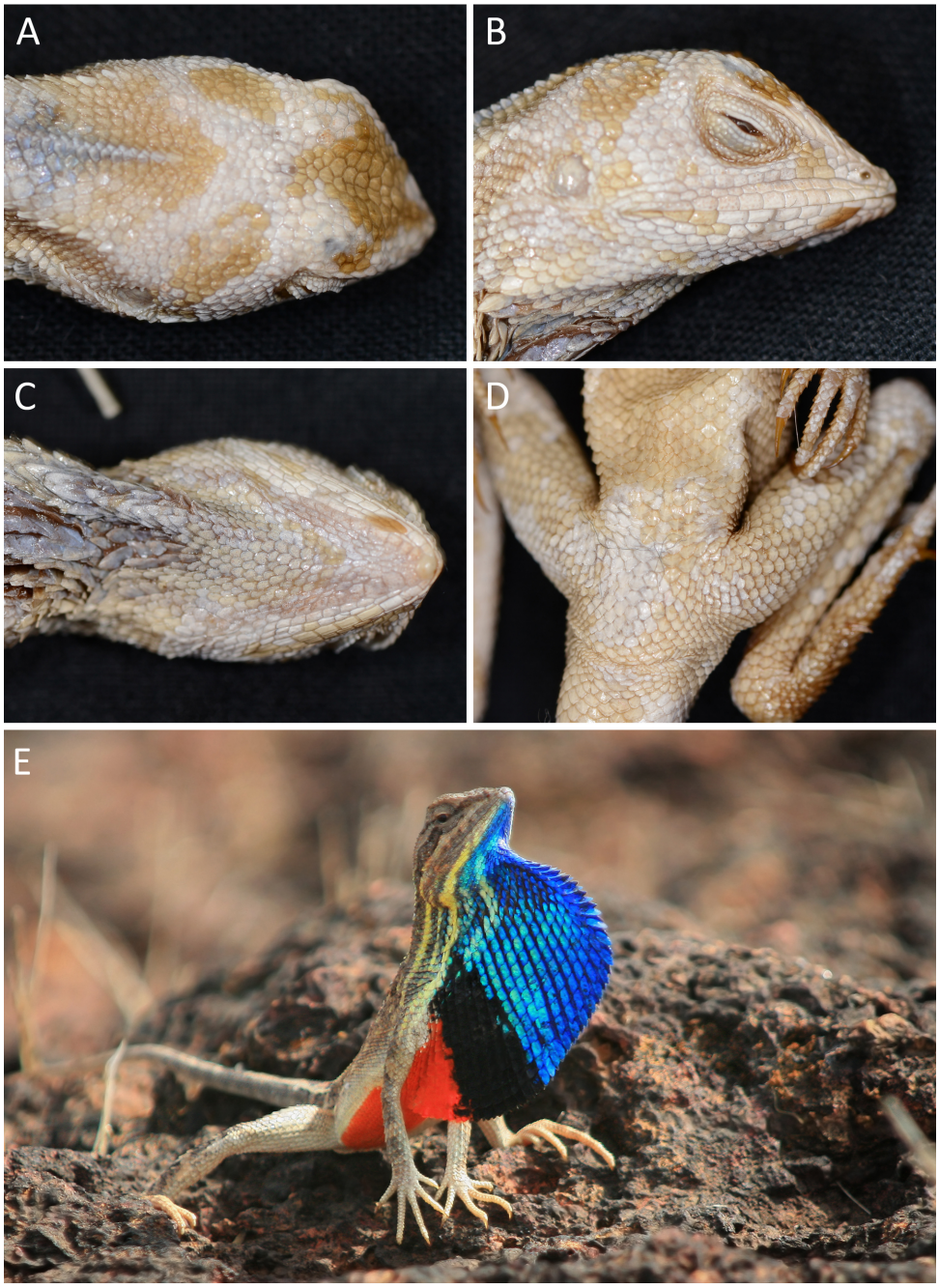


**FIGURE 5.** *Sitana deccanensis* Jerdon, 1870 syntype (BMNH 1946.8.27.39) (**A)** dorsal view of head; (**B)** lateral view of head; (**C)** ventral view of head; (**D)** ventral view of thigh and tail base (photo: P.D. Campbell); (**E**) *Sitana deccanensis* live breeding male (not collected) with expanded throat-fan at Satara, Maharashtra State, India (photo: J. Katre in 2011).

being dorsoventrally, ear-opening with enlarged unkeeled scales anteriorly but not posteriorly, tympanum smaller than orbit (TYD 40.7% of ED); no spines or enlarged scales above the tympanum, but the scales above the tympanum are keeled; diameter of eyes greater than eye to ear distance (ED 122.9% of TYE); forehead concave; scales on snout keeled, smaller than those of occipital region; scales on interorbital and supercilium area keeled; no nuchal or dorsal crest; rostral scale width greater than height, ventro-posteriorly in contact with the first supralabial, in contact posteriorly with the prenasal and three equal sized postrostral scales; two supranasals around nostrils on each side, three postnasals with the lower smallest and the middle largest, a single upper supralabial and one prenasal; nostrils oval and located in the middle of an undivided nasal plate; *canthus rostralis* and superciliary edges sharp; parietal plate lozenge shaped (anterior sides shorter than posterior sides) including a grey-blue coloured "pineal eye", parietal plate larger than adjacent plates. Mental subtriangular, approximately equal in

length and width, posteriorlaterally in contact with two enlarged postmentals separated by a third smaller median gular scale preventing contact between them; first postmental pair bordered posteriorly by four smooth scales exclusive of infralabial. Throat-fan large, posterior scales reach mid venter (DWL 70.6% of SVL, ADW 50.3% of AG), margin of the anterior part of the throat-fan covered with smooth, overlapping, bluntly pointed scales, posterior part (from the middle of the throat to the midventer) with long, elongate and lanceolate bluntly pointed scales; throat scales rounded, smooth and overlapping; three scale rows separate orbit from supralabials; supralabials 12 ($9^{th}$ in mid orbit position); infralabials 10, decreasing in size towards gape; scales on the throat-fan smooth but adjacent ventral scales slightly keeled and mucronate, overlapping.

**FIGURE 6.** *Sitana deccanensis* live breeding male (not collected) with expanded throat-fan at Belgaum, Karnataka State, India (photo: N. Sant).

Body slender (AG 45.6% of SVL); mid dorsal scales equal, keeled, elongate with pointed dorsal scales at midbody, keels straight forming longitudinal continuous parallel ridges; scales on dorsum at midbody larger than those of venter at same level; lateral body scales equal, regular, keeled, mucronate, smaller than dorsals and

without randomly distributed enlarged scales; upper dorsolateral scales directed backwards and upwards, dorsoventral ones directed backwards and downwards; 70 scales around midbody; pectoral scales not enlarged, keeled, mucronate, short and overlapping; abdominal scales enlarged and bluntly-pointed; ventral keels forming regular and parallel continuous ridges; no preanal or femoral pores. Ventrals 92.

Upper arm somewhat shorter than lower arm (UAL 19.5% of SVL; LAL 19.8% of SVL); femur shorter than tibia (FEL 26.5% of SVL; TBL 31.9% of SVL; FEL 82.9% of TBL). Dorsal scales on fore and hind limbs not enlarged, keeled, overlapping, and mucronate; ventral scales on upper and lower arm not enlarged, keeled, overlapping, and mucronate; scales on dorsal and ventral surface of thigh keeled, overlapping and mucronate; keels on dorsal and ventral arm and foot forming a series of continuous parallel ridges. Digits elongate, slender, all bearing slightly recurved claws; claws are sharp and elongate; subdigital lamellae entire and mucronate, 13 subdigital lamellae on the toe III, and 19 on toe IV; inter-digital webbing absent; relative length of fingers 3 > 4 > 2 > 5 > 1, and toes 4 > 3 > 2 > 1.

Tail incomplete (broken); tail base swollen, ventral scales and dorsal scales on tail keeled, elongate, overlapping, directed backwards, keels forming continuous parallel ridges; remnant tail with subcaudals on median row not enlarged, keeled, overlapping.

**Colour in preserved specimen.** Based on syntype, BMNH 1946.8.27.39. Colouration and markings almost faded. General colouration whitish dorsally and ventrally with some scattered darker marks irregularly placed. Throat-fan with three colours: anterior 3/4$^{th}$ light blue and black and posterior 1/4$^{th}$ whitish.

**Colour in life.** See following corresponding figures of *S. deccanensis* in Manthey (2010: 155–157): RA04103–111 identified as "*Sitana* sp. A". See also the illustration [Atlas - plate 16, figure 2] of *S. ponticeriana* which was made by Duvernoy (1846) but which corresponds to *S. deccanensis*.

**Variation in the second syntype (BMNH 1946.8.27.40).** 66 scale rows around midbody; ventrals, 83; subdigital lamellae on the toe IV, 23.

**Suggested common names.** English name: Deccan Fan-throat Lizard; French name: Sitane du Deccan.

**Distribution.** See map Fig. 9. South-western India, observed (not collected) populations referred to *Sitana deccanensis* from Belgaum in Karnataka State and Satara in Maharashtra State. Also see MNHN 6023 which was collected from Bellary in Karnataka State.

### ***Sitana ponticeriana*** **Cuvier, 1829**

(Figs. 7, 8; Tables 1, 2, 4)

*Semiophorus pondiceriana*—Wagler, 1830.
*Semiophorus pondicerianus*—Wiegmann, 1834.
*Sitana minor* Günther, 1864.
*Sitana ponticeriana ponticeriana*—Deraniyagala (1953) [*Partim*]

**Lectotype** [designated by Duméril & Bibron (1837)]**:** Male, MNHN 6901, SVL 47.5 mm, collected at Pondichéry (now Puducherry, Tamil Nadu State, India) by Leschenault between 1816 and 1822. **Note.** The original type series (in which we include only two syntypes) is available at MNHN. Among them Duméril & Bibron (1837) implicitly designated MNHN 6901 as the lectotype (see Brygoo, 1988).

**Paralectotype.** Male, MNHN 6902, SVL 54.0 mm, Genji, Coromandel, coll. Hope.

**Other Specimens examined.** Males, ZMB 44106–7, SVL respectively 50.0 mm, 47.0 mm, Pondichéry, India, coll. F. H. Remani, 12 November 1971; Male, BMNH 1946.8.27.42 (now lectotype of *S. minor*), SVL 53 mm, Madras (now Chennai, Tamil Nadu State), India, presented by T. C. Jerdon; Male, MNHN 1902.0151, SVL 46 mm, Genji, Coromandel, coll. Maindron.

**Diagnosis for adult males.** *Sitana ponticeriana* differs from all congeners by having the following characters: ***S. bahiri*** **sp. nov.**: snout longer ES 61.5–68.1% of HW (vs. shorter, ES 54.7–57.4% of HW), throat-fan longer ADW 31.1–54.7% of AG (vs. shorter, ADW 28.3–29.2% of AG), femur longer FEL 80.0–84.8% of TBL (vs. shorter, 70.6–75.3% of TBL), ventral scales 65–69 (vs. 87–89), breeding-males with bright red colour patch (vs. bleached orange colour patch); ***S. devakai*** **sp. nov.**: femur longer FEL 80.0–84.8% of TBL (vs. shorter, FEL 72.2–78.4% of TBL), ventral scales 65–69 (vs. 100–108), abdominal scales rounded (vs. pointed); **S. *deccanensis*:** smaller SVL 48.0–49.0 mm (vs. larger SVL above 60.0 mm), snout longer ES 61.5–68.1% of HW (vs. shorter, ES

53.1–53.4% of HW), throat-fan shorter ADW 31.1–54.7% of AG (vs. longer, ADW 50.3–60.2% of AG), foot longer FOL 150.9–175.5% of HL (vs. shorter, FOL 131.9–144.6% of HL), supralabials 8–10 (vs. 12), midbody scale rows 66–70 (vs. 50–54), ventral scales 65–69 (vs. 82–92), enlarged scales above the tympanum present (vs. absent), unequal and irregular lateral scales with intermediate enlarged scales (vs. equal and regular lateral scales without enlarged scales), breeding-males with bright red colour patch restricted to mid throat-fan (vs. bright red patch extending to vent); ***Sitana sivalensis*** **complex:** throat-fan extending up to the abdomen (vs. not extending to the level of the axilla), foot longer FOL 150.9–175.5% of HL (vs. shorter, FOL 120.0–144.3% of HL).

**Description of the lectotype (MNHN 6901).** An adult male, 47.5 mm SVL; head moderately large (HL 27.4% of SVL), elongate (HW 63.2% of HL), narrow (HW 17.3% of SVL), distinct from neck; snout elongate (ES 63.5% of HW); snout length greater than eye diameter (ED 70.4% of ES); interorbital distance broad (IO 19.3% of HL); eye large (ED 28.3% of HL); pupil rounded; ear-opening shallow, its greatest diameter being dorsoventral, ear-opening with enlarged unkeeled scales anteriorly but not posteriorly, tympanum smaller than orbit (TYD 39.0% of ED); no spines above the tympanum but an enlarged keeled scale above the tympanum separated from the tympanum by two smaller scale rows; diameter of eyes larger than eye to ear distance (ED 101.0% of TYE); forehead concave; scales on snout keeled, smaller than those of occipital region; scales on interorbital and supercilium area keeled; no nuchal or dorsal crest; rostral scale width greater than height, ventro-posteriorly in contact with first supralabial, in contact posteriorly with the prenasal and three equal sized postrostral scales; nostrils rounded located in the middle of an undivided nasal plate; *canthus rostralis* and superciliary edges sharp; parietal plate lozenge shaped (anterior sides shorter than posterior sides) including a grey-blue coloured "pineal eye"; parietal plate larger than adjacent plates. Mental subtriangular, lengthen posteriorly, approximately equal in length and width, two enlarged postmentals laterally situated and separated by a smaller scale preventing contact between them; each postmental pair bordered posteriorly by four (in left side) and five (in right side) smooth scales including the medial scale, but exclusive of infralabial. Throat-fan medium sized, posterior scales reaching mid venter (DWL 58.5% of SVL, ADW 46.5% of AG), margin of the anterior part of the throat-fan covered with smooth, overlapping, bluntly pointed scales, posterior part (from the middle of the throat to the midventer) with long and elongate lanceolate bluntly pointed scales; throat scales rounded, smooth and overlapping; three scale rows separate orbit from supralabials; supralabials 9 ($6^{th}$ in mid orbit position); infralabials 9, decreasing in size towards gape; scales on the throat-fan smooth but adjacent ventral scales strongly keeled and mucronate, overlapping.

Body slender (AG 43.2% of SVL); mid dorsal scales equal, keeled, elongate with pointed dorsal scales at midbody, keels straight, forming longitudinal, continuous parallel ridges; scales on dorsum at midbody larger than those of venter at same level; lateral body scales unequal, irregular, keeled, mucronate, smaller than dorsals and with randomly distributed enlarged, mucronate, keeled scales; upper dorsolateral scales directed upwards and backwards, dorsoventral ones directed downwards and backwards; 54 scales around midbody; pectoral scales enlarged, keeled, mucronate, elongate and overlapping; abdominal scales short and rounded; ventral keels forming regular parallel and continuous ridges; no preanal or femoral pores. Ventrals 67.

Upper arm longer than lower arm (UAL 20.5% of SVL; LAL 15.8% of SVL); femur shorter than tibia (FEL 27.5% of SVL; TBL 34.4% of SVL; FEL 80.0% of TBL). Dorsal scales on fore and hind limbs not enlarged, keeled, overlapping, and mucronate; ventral scales on upper and lower arm not enlarged, keeled, overlapping, and mucronate; scales on dorsal and ventral surface of thigh keeled, overlapping and mucronate; keels on dorsal and ventral arm and foot forming a series of continuous parallel ridges. Digits elongate, slender, all bearing slightly recurved claws; claws are sharp and elongate; subdigital lamellae entire and mucronate, 15 subdigital lamellae on the toe III, and 24 on toe IV; inter-digital webbing absent; relative length of fingers 3 > 4 > 2 > 5 > 1, and toes 4 > 3 > 2 > 1.

Tail incomplete (broken); tail base swollen, ventral scales on tail base keeled (distal part of its tail which is still coloured clearly shows stronger keels than proximal part on ventral tail scales), dorsal scales on tail keeled, elongate, overlapping, directed backwards, keels forming continuous parallel ridges; entire tail with subcaudals on median row not enlarged, keeled, not mucronate, overlapping.

**Colour in preserved specimen.** Upper head and back cream to light brownish with five pairs of dark edged rhomboidal spots, the back is bordered on each side with a brownish ventrolateral band spotted with whitish dots. In the middle of the back are five rhomboidal spots which are more or less clearly separated medially by a lighter band formed by one or two vertebral scale rows. The first dark blotch is located in front of anterior members, the

second behind anterior members, the third in the middle of the back, the fourth in front of posterior members, and the fifth between posterior members; a light streak runs from the nasal below the eye, over the tympanum to the forelimb; lower parts, including the throat-fan whitish or light greyish to cream. A dark brown, wing shaped band is clearly visible on the head between the eyes; claws being dorsally dark brown and ventrally yellowish.

**Colour in life.** No live population observed. See following corresponding figures in Manthey (2010: 152): RA04141-2.

**Variation in other specimens from the type locality.** Eight infralabials in both sides; 50 and 53 scales around midbody; respectively 69 and 65 ventral scales in ZMB 44106 and ZMB 44107; subdigital lamellae on the toe III, 11 in ZMB 44106 and toe IV, 20–21 in both ZMB specimens; ventral scales on tail base keeled.

**Suggested common names.** English name: Pondichéry Fan-throated Lizard, French name: Sitane de Pondichéry.

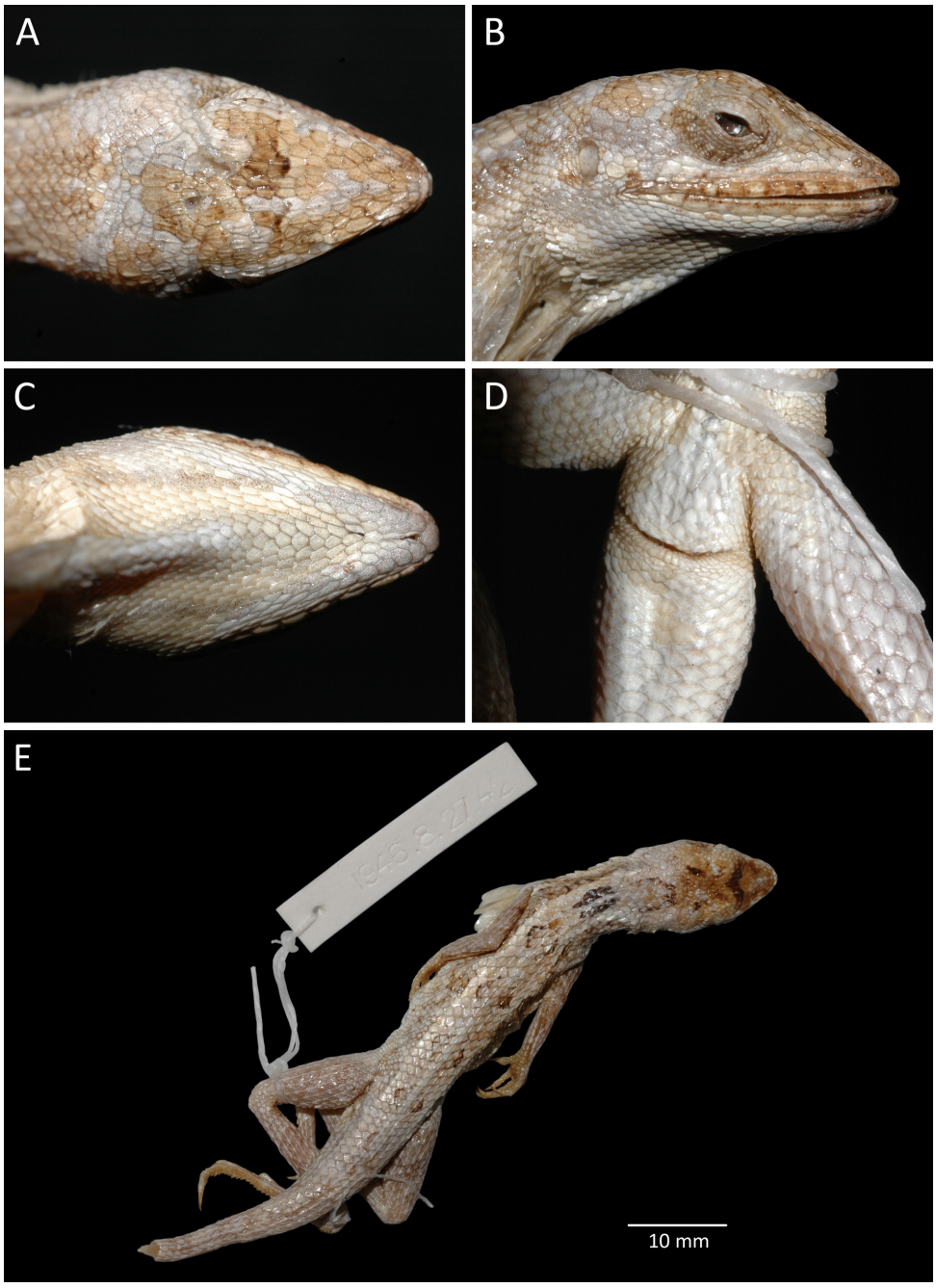


**FIGURE 7.** *Sitana ponticeriana* Cuvier, 1829 lectotype (MNHN 6901) (**A)** dorsal view of head; (**B)** lateral view of head; (**C**) ventral head view; (**D)** ventral view of thigh and tail base; (**E**) *Sitana minor* Günther, 1864 lectotype (BMNH 1946.8.27.42) (photo: I. Ineich).

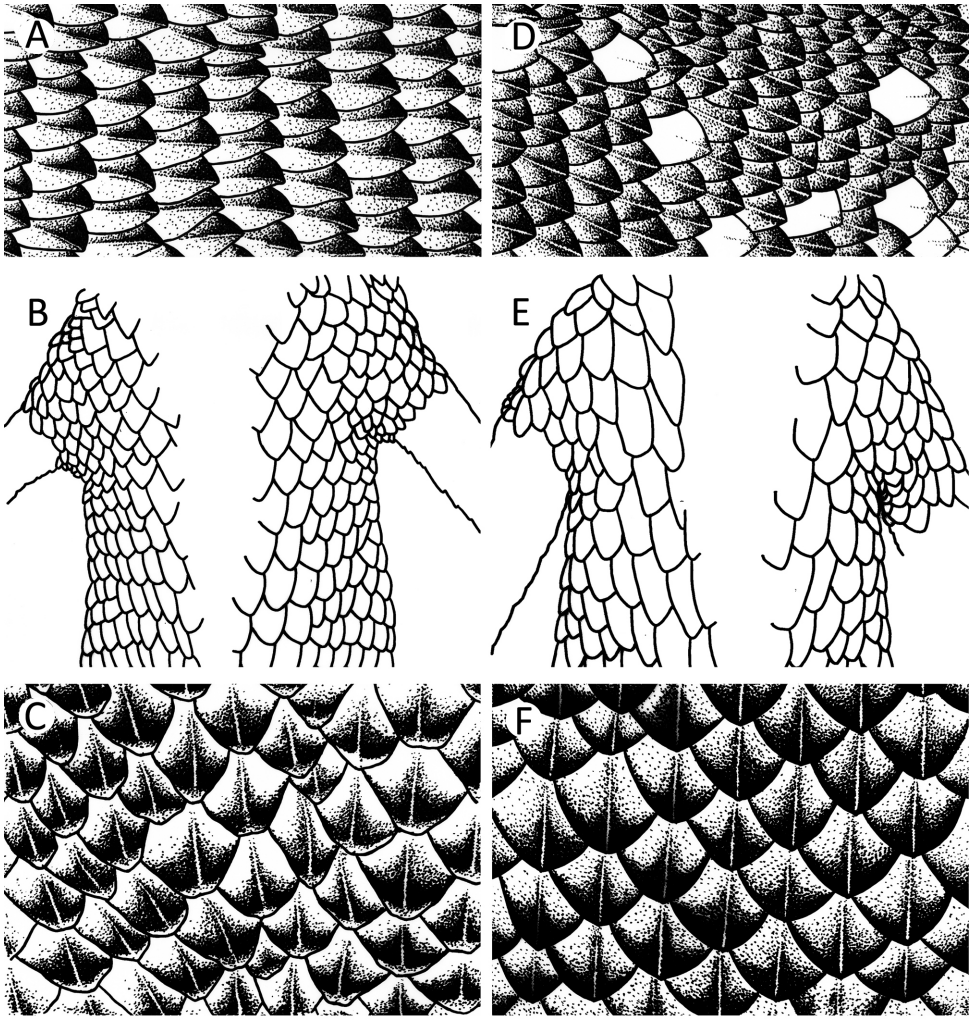


**FIGURE 8.** *Sitana deccanensis* syntype (BMNH 1946.8.27.39) (**A**) lateral body scales; (**B**) pectoral scales; (**C**) abdominal scales; *Sitana ponticeriana* lectotype (MNHN 6901) (**D**) lateral body scales; (**E**) pectoral scales; (**F**) abdominal scales (illustrated by A.A.T. Amarasinghe).

**Distribution.** See map Fig. 9. South-eastern India, recorded from Pondichéry, Madras (=Chennai) and Genji, Coromandel Coast.

## Discussion

Statistically informative tests could not be performed on separate sexes because of the absence of female specimens among the type materials of *S. ponticeriana* and *S. deccanensis*, and the small sample sizes available to us; thus we decided to only use males in our samples.

The *Sitana sivalensis* complex differs significantly from all our other Indian and Sri Lankan populations by several obvious morphometric, scalation and colouration characters. Our aim here was to also try and tackle some of the unsolved taxonomic issues in Indian populations. Furthermore, we feel that the diagnosis of *S. sivalensis* Schleich et al., 1998, *S. fusca* Schleich & Kästle, 1998 and *S. schleichi* Anders & Kästle, 2002 should be re-assessed and re-evaluated, due to poor descriptions and incomplete diagnoses. A selection of males from each species of the *Sitana sivalensis* complex should at least be compared in order to write more meaningful species descriptions based on significant morphometric comparative analysis. All species of the *S. sivalensis* complex were mainly described using female specimens with both male and female characters being considered together and not separately. This does not allow a proper diagnosis in order to distinguish the recognised taxa. In particular, *S. fusca* and *S. schleichi* should be compared using DNA analysis.


**FIGURE 9.** Distribution map of *S. ponticeriana* (yellow), *S. deccanensis* (green), *Sitana* cf. *devakai* (purple), *S.* cf. *ponticeriana* (orange), *Sitana sivalensis* complex (grey), *S. bahiri* **sp. nov.** (blue); *S. devakai* **sp. nov.** (black); and *S. ponticeriana mucronata* (red). Holotype locality of each Sri Lankan species marked with squares.

The collection date of the lectotype of *Sitana ponticeriana* (MNHN 6901) is unknown, but Leschenault is the collector. Jean-Baptiste Leschenault de la Tour visited India (Tamil Nadu and Bengal States) and Sri Lanka from May 1816 to 1822, therefore the collection date could be anywhere between the years 1816 and 1822. The lectotype was registered as "*Sitana ponticeriana*" in the MNHN catalogue and in the oldest MNHN collection register dated 1864. At the time of Cuvier (1829), however, we believe that there were at least two available specimens of *Sitana* (MNHN 6901–2) in the MNHN collections (see above under *S. ponticeriana*). Based on this assumption, we give our support to the correct selection of MNHN 6901 as a lectotype [designated by Duméril & Bibron (1837); see also Brygoo (1988)] and consider MNHN 6902 as a paralectotype. Brygoo (1988) could not find the specimen which had been collected from Pondichéry among the MNHN collections in 1988 and he considered it lost or misplaced. That specimen is now, once again, present and available in MNHN collections. In his original

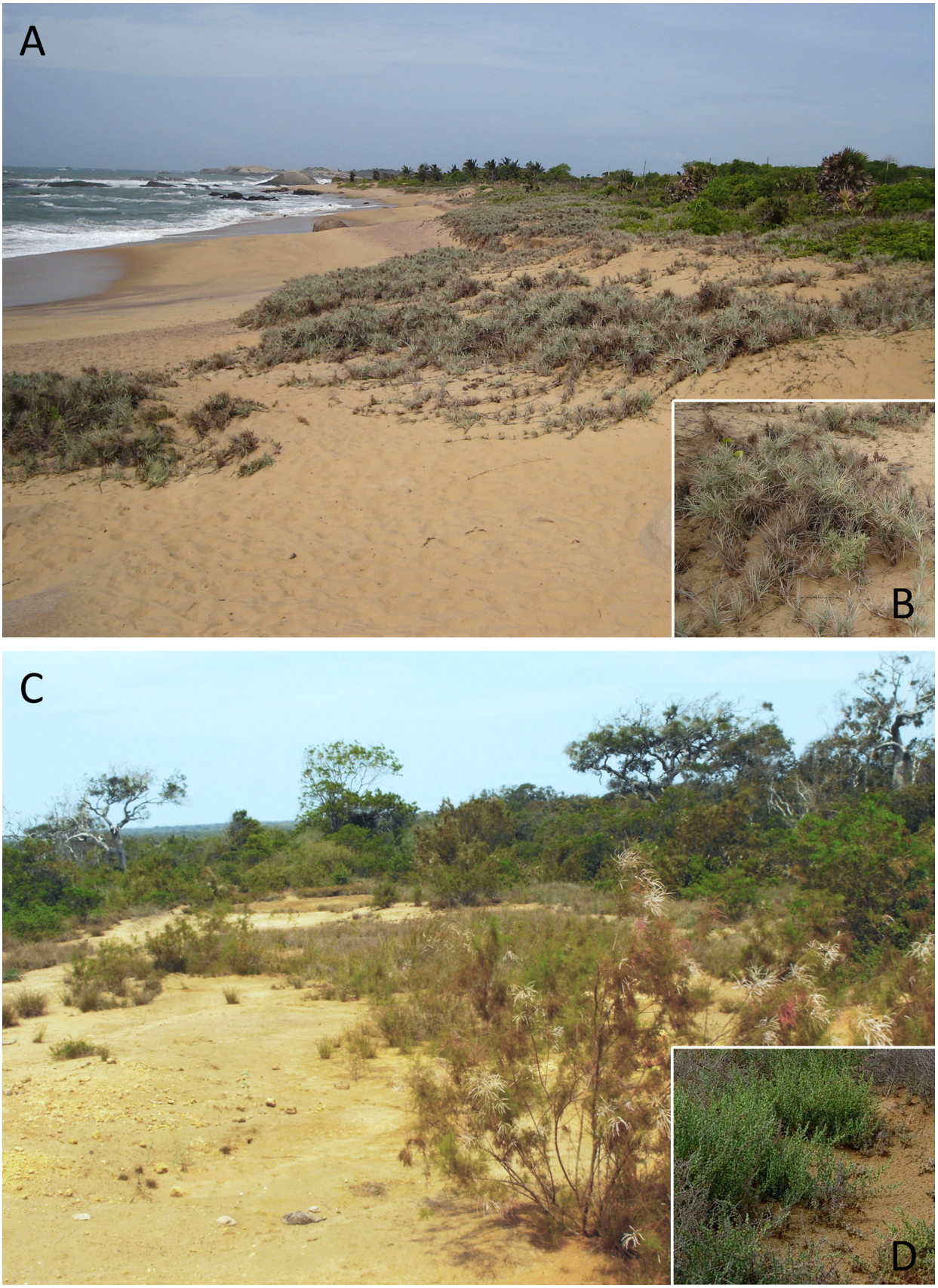


**FIGURE 10.** Habitat of *Sitana bahiri* **sp. nov.** (**A**) dry coastal area in Palatupana, Kirinda, Sri Lanka; (**B**) coast covered with *Spinifex littorus* (photo: A.A.T. Amarasinghe); habitat of *Sitana devakai* **sp. nov.** (**C**) dry warm sandy area in Puttalam, Sri Lanka; (**D**) area covered with *Abelmoschus angulosus* (photo: D.M.S.S. Karunarathna).

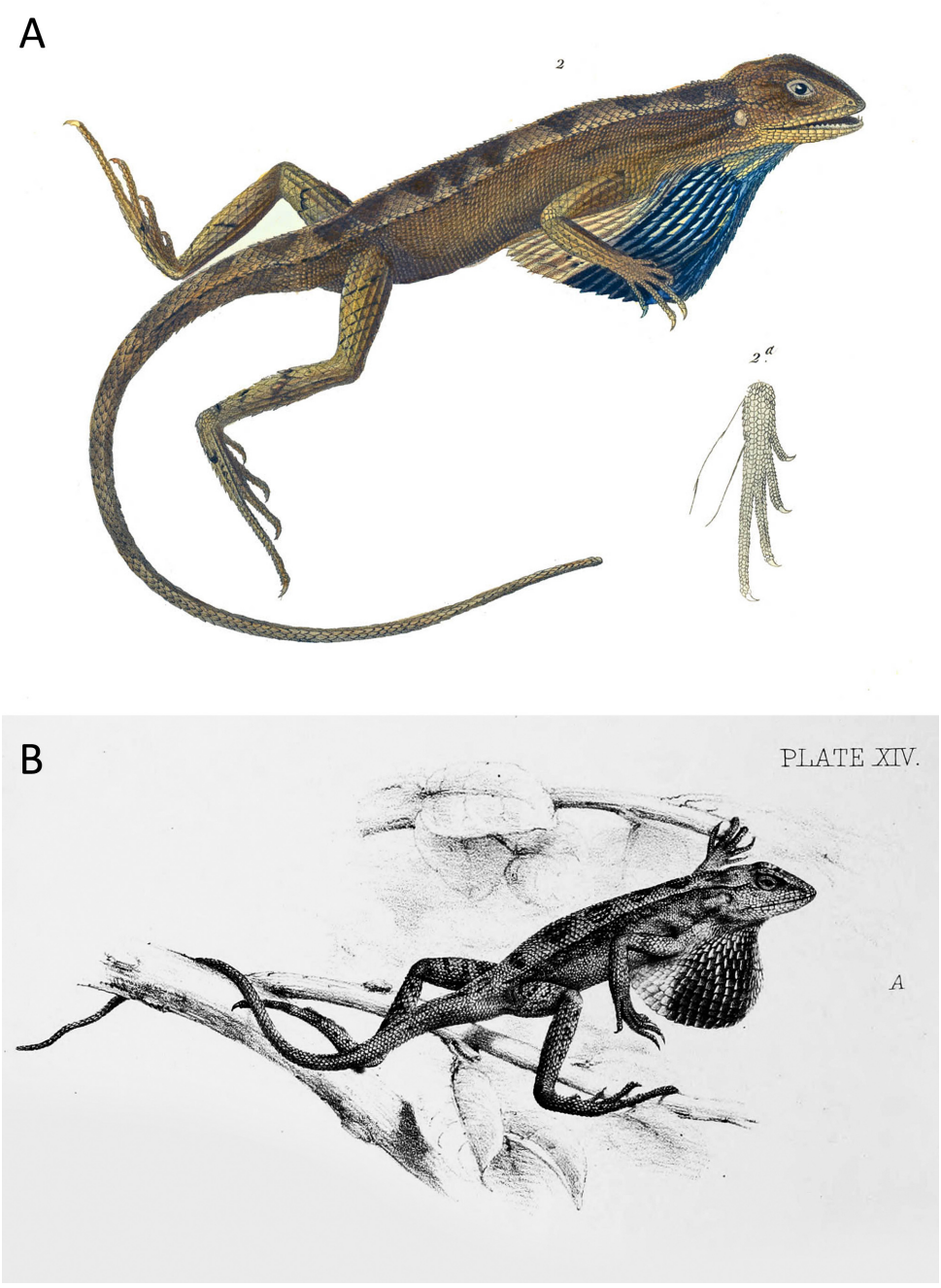


**FIGURE 11.** (**A**) An illustration of *Sitana deccanensis* (originally indicated as *Sitana ponticeriana*) reprinted from Duvernoy, 1846 (Le Règne Animal, pl. 16, fig. 2); (**B**) the original figure of *Sitana minor* reprinted from Günther, 1864 (The Reptiles of British India, pl. XIV, fig. A).

description, Cuvier (1829) indicated the local name of "*Sitana*" for the lizard on the "côte de Cormandel [sic]" [= Coromandel Coast], thus showing that the specimens available at his time at the MNHN were not only from Pondichéry. Therefore, the MNHN specimens available at the time of Cuvier's original description, and indicated as coming from Coromandel Coast, must be considered as part of the type series which Cuvier had available at his disposal. Among the currently available specimens at MNHN, only MNHN 6902 and MNHN 1902.0151 were collected from Genji, Coromandel, by Hope and Maindron respectively. MNHN 1902.0151 cannot be part of original syntypes of *S. ponticeriana* and must have been added later to the MNHN collections following Maurice Maindron's second visit to India in 1900–1901 (Simon 1905). The specimen MNHN 6902 could have arrived at the MNHN before 1829. The collector of MNHN 6902, "Hope" cannot be Frederick William Hope (1797–1862), who was an English entomologist (Bettany 1885–1900). There is no record that he visited India, even though he described many species

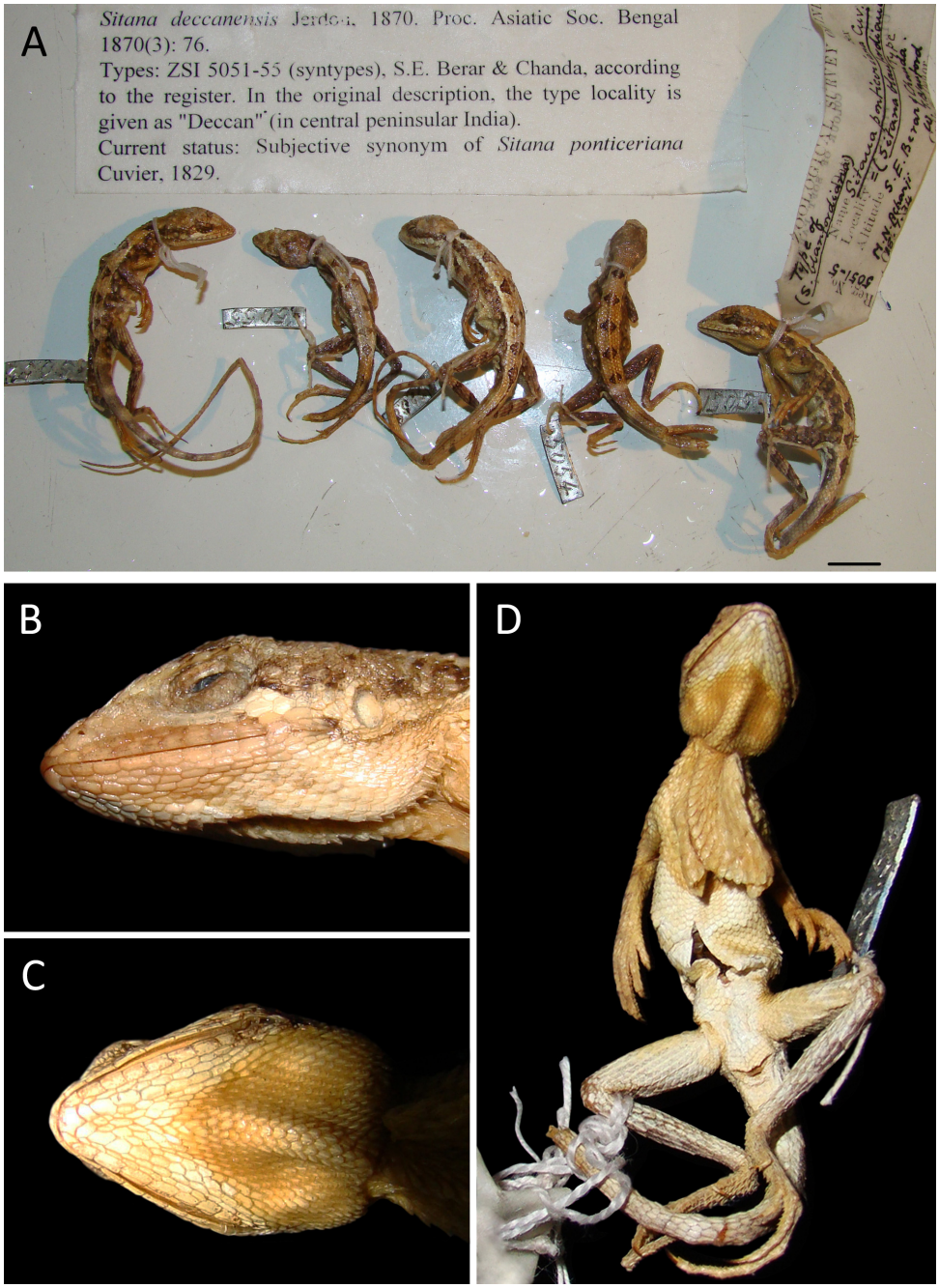


**FIGURE 12.** (**A**) The invalid syntypes of *S. deccanensis* (ZSI 5051–5) rediscovered by Das *et al.*, 1998 (now referred to *Sitana* cf. *ponticeriana*); (**B**) lateral view of head of *Sitana* cf. *ponticeriana* (ZSI 22720E) from Orissa, India; *Sitana* cf. *ponticeriana* (ZSI 5051) from S.E. Berar and Chanda, Bihar, India (**C**) ventral view of head and (**D**) ventral view of body (photo: W.M.S. Botejue).

of insects from there (Smith 1986); most of his Indian species descriptions were completed using specimens collected by other people such as Theodore Edward Cantor (1809–1860) and Edward Griffith (1790–1858) (Smith 1986). It seems therefore hard to accept that F. W. Hope could be the collector of MNHN 6902. Thus "Hope" indicated as collector could be a reference to another person with the same name. Or it may be that F. W. Hope received the specimen from another source before the specimen arrived at the MNHN collections. Therefore we assume that, *sensu* Cuvier (1829) and Duméril & Bibron (1837), MNHN 6902 could be part of the original syntypes examined by Cuvier (1829). The other currently available MNHN specimens were collected by Victor Vincelas Jacquemont, and the associated labels give only "Indes Orientales" as the locality. Jacquemont lived in India from 1828 to 1832, and mostly frequented the North-western and North-eastern parts of India (Lancaster

2013). He died in Mumbai in 1832 (Lancaster 2013) and his collections were sent to the MNHN later, probably in 1833. Figure 2 of *S. ponticeriana* published by Duvernoy (1846) (Fig. 11) is completely different from both MNHN 6901 and MNHN 6902, and seems to have been produced using specimens from Jacquemont's collection (MNHN 2568, MNHN 6903–4), although it is not possible to specify precisely which MNHN specimen was used for the drawing. We refer the specimen illustrated on that plate under *S. ponticeriana* to *S. deccanensis*.

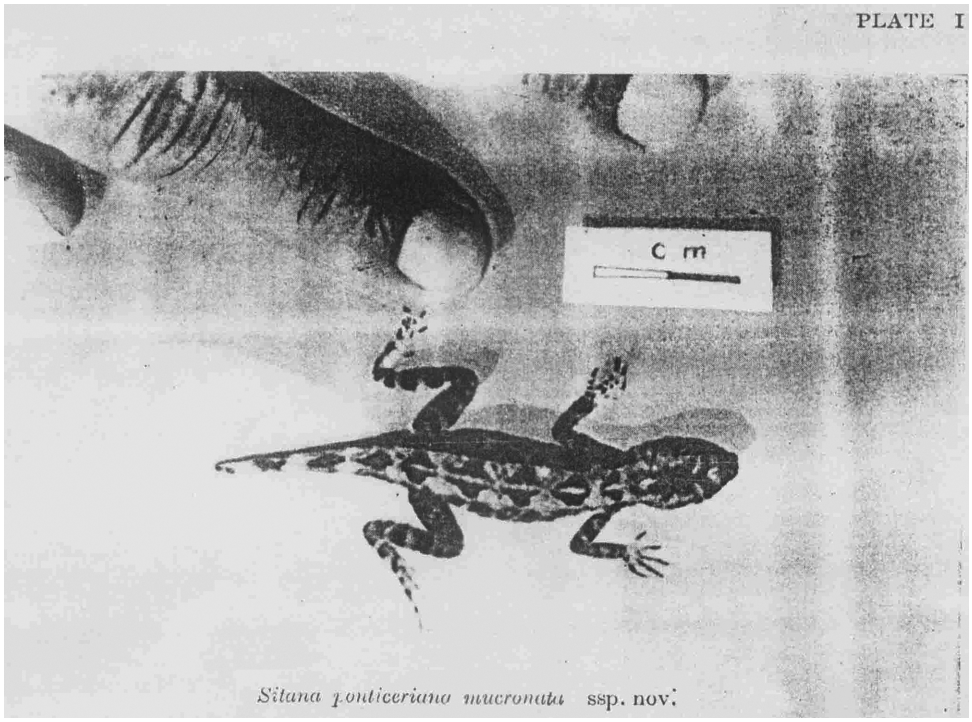


**FIGURE 13.** The original figure of *Sitana ponticeriana mucronata* Deraniyagala, 1957 reprinted from Deraniyagala, 1957 (Administrative reports of National museums of Sri Lanka, E4, pl. 1).

Günther (1864) did not clearly designate the type specimens when describing *S. minor*, but the description implies that he had more than one specimen at his disposal (e.g. "the foot of a *S. minor* …… full-grown specimens …"). Moreover he only indicated "the neighbourhood of Madras" as the main locality for his recognised taxon and noted that adult specimens reach two inches maximum in body size [~50 mm] (thus clearly excluding *S. deccanensis* which is much larger). Later Boulenger (1885) synonymized this species under *S. ponticeriana* while citing eight specimens as syntypes of *S. minor* (Table 4). According to the present BMNH catalogues there are ten specimens indicated as "cotypes" of *S. minor*. Due to the ambiguity in defining the composition of the original syntype series, we here prefer to consider only the specimens indicated from Madras (BMNH 1946.8.27.41–43) as true syntypes of *S. minor*. Among these three syntypes two of them (BMNH 1946.8.27.41–42) are males, and BMNH 1946.8.27.43 is a female. Among male specimens, one specimen (BMNH 1946.8.27.42) measures 2 inches (~50mm) in body length. The other specimen (BMNH 1946.8.27.41) is larger (SVL 60.0mm) and we identified it as *S. deccanensis*. We cannot be sure whether or not if this lizard was mislabelled or whether or not it was added to the type series later. It most likely belongs to the syntype series of *S. deccanensis*. However, the smaller (2-inch) specimen (BMNH 1946.8.27.42) most probably belongs to the true syntype series of *S. minor*. Therefore, we designate this specimen as the lectotype of *S. minor* (Fig. 7) in order to stabilize that name with a recognised type specimen. This specimen is from the syntypic series used by Günther (1864) in its original description of *S. minor*. However, it seems that Günther (1864) used a different specimen to illustrate Fig. A of *S. minor* in plate XIV (see Fig. 11 of this document). We want to make it clear that we do not want to attribute the name *S. minor* to the illustrated specimen of Gunther (1864).

The lectotype here designated is morphologically identical (based on our set of characters) with the lectotype of *S. ponticeriana* and other specimens from its type-locality. Furthermore, Günther's (1864) identification, and the characters that he used in the original description, lack many important diagnostic features, making the recognition of *S. minor* a distinct valid species of *Sitana*. Günther (1864), in his key, considered the extension of the hind limb

as a diagnostic character to distinguish *S. minor* from *S. ponticeriana*. Boulenger (1885) tested this character in the syntypes of *S. minor*, but noted that the hind feet extended to the orbit in some specimens and beyond the orbit in others. Hence, taking into account our own findings, we follow him in considering *S. minor* as a junior objective synonym of *S. ponticeriana*. We also identified two specimens (BMNH1946.8.30.55–56), which cannot be a part of the *S. minor* syntypic series, originally excluded from Boulenger's 1885 list which mentions only eight specimens. Those specimens have to be excluded from the type series (see Table 4).

**TABLE 4.** Clarification of specimens data which were held at the BMNH collection prior to 1885 based on Boulenger (1885) and the museum registry; M, male; F, female; (J), juvenile.

| Based on Boulenger (1885) | | | | | Current collection | | | New status (designate here) |
|---|---|---|---|---|---|---|---|---|
| Cat. no. | Sex | Location | Presenter or Collector | Status | Registry | | Status (jar label) | |
| | | | | | Cat. no. | Presenter or Collector | | |
| e | M | India | Presented by J. E. Gray | types of *S. minor* | 1946.8.27.39 | Presented by J. E. Gray | co-types of *S. minor* | Syntypes of *S. deccanensis* |
| f | M | | | | 1946.8.27.40 | | | |
| g | F | | | | 1946.8.30.53 | | | *Sitana* insertae sedis |
| h | M | | | | 1946.8.30.54 | | | *S. ponticeriana* |
| i | F | India | Mathers | | 1946.8.27.44 | Mathers | | not examined (J) |
| k | M | Madras | Presented by T. C. Jerdon | | 1946.8.27.41 | Presented by T. C. Jerdon | | *S.* cf. *deccanensis* |
| l | M | | | | 1946.8.27.42 | | | Lectotype of *S. minor* |
| m | F | | | | 1946.8.27.43 | | | *Sitana* insertae sedis |
| | F | not included in Boulenger (1885) and maybe added later | | | 1946.8.30.55 | Presented by J. E. Gray | | *Sitana* insertae sedis |
| | M | | | | 1946.8.30.56 | | | not examined (J) |

Jerdon (1870) did not provide any diagnostic characters showing how he was able to distinguish *Sitana deccanensis* from *S. ponticeriana* and *S. minor*. However, it is clear that Jerdon was knowledgeable about the north Indian *Sitana* population; he wrote the following (17 years prior to the description of his new species): "I have not seen the beautiful dewlap (blue, black and red) developed in the south of India, nearly to the extent that appears to take place in the north, and there it attains a greater size" (Jerdon, 1853). In the description of his new species (restricted to a few lines) in 1870, he stated ".....and the Deccan species, being the larger of the two, cannot well stand as *S. minor*, and will require a new name, for which I propose *Deccanensis*, .....". This statement, taken in the context of his earlier (1853) comments, clearly implies that *S. deccanensis* should be at least somewhat larger than both *S. ponticeriana* and *S. minor*.

The supposed type series of *S. deccanensis*, which Das et al. (1998) thought had been rediscovered in ZSI, comprises five adult specimens (Fig. 12): (1) male, 43.5 mm SVL, ZSI 5051; (2) male, 39.3 mm SVL, ZSI 5052; (3) male, 38.9 mm SVL, ZSI 5053; (4) female, 35.1 mm SVL, ZSI 5054; (5) female, 32.8 mm SVL, ZSI 5055. All of those supposed types are smaller than all the known *Sitana* species in India. No original labels were found with those supposed type specimens. A label tied to ZSI 5051 reads "Zoological Survey of India; Type of (*S. blanfordiana*); *Sitana ponticeriana* Cuv.; =(*Sitana blanfordiana*); 5051–55 S. E. Berar & Chanda; W. T. Blanford as the collector; M. N. Achanji; (18.7.34)". In addition, there is another label (which appears to be more recent, so most probably must have been added later) in the jar containing the syntypes which reads "*Sitana deccanensis* Jerdon, 1870. Proc. Asiatic Soc. Bengal 1870 (3): 76; Types: ZSI 5051–55 (syntypes). S. E. Berar & Chanda", perhaps later added by Das et al. (1998). Specimens ZSI 5051–55 may therefore be a part of the collection, along with BMNH 72.3.22.2–3 (both having been donated by Indian museums), or part of BMNH 80.11.10.52–56 & 80.11.10.82–86, all collected by Blanford. This would be William Thomas Blanford (1832–1905), who was awarded a position on the Geological Survey of India in 1854 (Chisholm 1911, Moore 2004). There is no evidence that Jerdon described *S. deccanensis* based on Blanford's collection deposited at ZSI. Jerdon (1870) stated "a few

of which are the results of my own researches, and very many from the most successful labours of Major Beddome", but never mentioned that he described *S. deccanensis* based on Blanford's collection. Nor is there anything attesting to Jerdon depositing the *S. deccanensis* type series in ZSI.

Considering all the above remarks together, we reject ZSI 5051–55 as syntypes of *Sitana deccanensis* Jerdon, 1870. The name *S. blanfordiana* on the label of ZSI 5051–55 may well have been just a name given for a new species dedicated to Blanford, but it was never described and published (*nomen indeditum*). If further studies show that these specimens belong to an undescribed taxon of the smaller morphotype, that name could be applied to them.

Interestingly, ZSI 5051–53 (three adult males), collected from South-east Berar and Chanda (in Bihar State), seem to belong to a distinctly new species characterized by its smaller SVL, 39.0–43.6 mm; SDL in toe IV, 16; ventrals, 98–109; and the fusion of the first postmentals. Furthermore, the specimens from Orissa show similar morphological characteristics (see Fig. 12), but we do not yet have substantial samples from that area in order to carry out a comprehensive taxonomic comparative study.

Thomas Caverhill Jerdon (1811–1872) was given an assistant surgeonship position in the East India Company's service and arrived at Madras in 1836. He worked in many different areas in India and later, in 1870, moved to Calcutta. While he was staying in Gauhati, Assam State, he suffered a severe attack of fever and his condition deteriorated rapidly, forcing him to return to England in June 1870; he died in 1872 (Elliot 1873). Jerdon's draft of his Indian herpetofaunal findings (where *S. deccanensis* is described) was received by the Asiatic Society on 1st February 1870 (Jerdon 1870) before Jerdon arrived in England in June 1870 (Elliot 1873). Jerdon stated "As some time will probably elapse before my work on the Reptiles of India can be published, I think it advisable to lay before the society a short account of some recent discoveries in Indian herpetology". Clearly, he was unable to publish the full description of his findings [there was no other publication by Jerdon on herpetofauna after his 1870 book (Jerdon 1870)] although he had hoped to give a detailed account according to his earlier statement. We believe that Jerdon took his collection to England to complete his descriptions in full, but unfortunately, died before having completed them. We strongly believe that the syntypes of *S. deccanensis* were deposited at the BMNH after his death or handed over to John Edward Gray, who was the keeper of zoology from 1840 until 1875. There are similar examples of other taxa, relating to Jerdon, which are considered type specimens, mentioned in the paper "Notes on Indian Herpetology", available at the BMNH. But these are not available in Indian museums (e.g. Ohler & Deuti, 2013). Thus specimens (BMNH 1946.8.27.39–40), mixed in together with those of the *Sitana minor* syntypes, and BMNH 74.4.29.229 & 74.4.29.1454–55 collected by R. H. Beddome (according to Jerdon 1870), might also be considered syntypes of *S. deccanensis* Jerdon, 1870. Although the Beddome specimens (BMNH 74.4.29.229 and BMNH 74.4.29.1454–55) are all juveniles, casting doubt on their qualification for their being part of this series. This leaves BMNH 1946.8.27.39–40, which are both distinct from *S. ponticeriana* sensu stricto, as strong candidates for being included as part (or the whole) of the original type series of *S. deccanensis*. These two specimens are the only larger bodied *Sitana* which were present in the BMNH collections before Boulenger (1885). Furthermore, we identified living populations of *S. deccanensis* from west and north-western India (see Figs. 5, 6), which belong geographically to what is called the Deccan plateau; the type locality of *S. deccanensis* could reasonably be considered as being located in this part of India. Nonetheless, to be sure of this location, specimens from a variety of other locations should be compared morphologically with these rediscovered syntypes.

Schleich *et al*. (1998) argued that "*S. minor* must be considered a taxon which is distinctly separate from the rest of the *S. ponticeriana* group" while considering *S. minor* as a large-fanned form. Although they failed to include a list of the specimens examined in their study, it is certain that they examined some specimens (e.g. BMNH 1946.8.27.41) belonging to the original syntypes of *S. minor* [a polyspecific type series; see above] now referable to *S. deccanensis*, but they mistakenly, considered them as typical *S. minor*, despite them not being in agreement with Günther's (1864) original description.

*Sitana ponticeriana mucronata* is known only from its holotype, which is either now lost, misplaced, or been destroyed (Bahir & Silva 2005). There are no live populations of *Sitana* recorded to date from the type locality, which is located in the wet zone of Sri Lanka and according to Bahir & Silva (2005) the name might actually be based on a misidentified specimen of *Otocryptis* sp.; to give weight to this claim, *O. wiegmanni* (e.g. WHT 1496) occurs in the type locality of *S. p. mucronata*, at Hiniduma (Galle) (06°20'N, 80°18'E, alt. 500 m a.s.l). Plate 1 of Deraniyagala (1957) (see Fig. 13) represents a smaller *Sitana* species (typical dorsal colour pattern, 4 toes present)

and not *Otocryptis* sp. Nevertheless, Deraniyagala's (1957) identification and the characters he used in the original description lacked many important diagnostic features leading to an unambiguous identification; with the lost type further complicating the situation. According to Deraniyagala (1957), "It is more thick set and slow moving and its scales are more elongate and acute"; but neither *S. ponticeriana* nor the Sri Lankan *Sitana* populations can be considered slow moving species. The reason for the confusion must be one of two things; either the Hiniduma population of *Sitana* described by Deraniyagala (1957) had rather dubious collection data, or Deraniyagala (1957) used a different specimen from the one which he should have used for the description in Plate 1 to illustrate his new taxon. We consider this taxon as a *nomen dubium*. Of course, if the holotype of *S. p. mucronata* or a live population matching that taxon is rediscovered from Hiniduma, then the status of *S. p. mucronata* will have to be reassessed. Note that some of the misplaced types in NMSL (e.g. paratype of *Sphenomorphus dorsicatenatus* Deraniyagala, 1953, see Batuwita & Pethiyagoda 2007) or in BMNH (e.g. holotype of *Cnemaspis podihuna* Deraniyagala, 1944, see Amarasinghe & Bauer 2009) were later rediscovered in collections.

In Sri Lanka, evidently the Mahaweli River and the wet zone (see Fig. 9) seem to act as a geographic barrier separating the two recognised Sri Lankan species of *Sitana*, and it would be interesting to investigate what the biogeographical time scale is for the separation of the two Sri Lankan species *S. bahiri* **sp. nov.** and *S. devakai* **sp. nov.** using molecular (DNA) data. In addition, it would be interesting to know the divergence time between *S. devakai* **sp. nov.** and the Indian *Sitana* populations.

## Key to adult males of the species of genus *Sitana*

1. SVL less than 55 mm, 7–10 supralabials, flanks with enlarged scales. . . . . 2
- SVL more than 60 mm, 11 or more supralabials, flanks without enlarged scales, breeding males have bright red patch on the throat-fan extending to the vent . . . . . *S. deccanensis*
2. Throat-fan extending beyond level of axilla, large foot more than 130% of HL . . . . . 3
- Throat-fan does not meet the axilla, short foot less than 130% of HL . . . . . *S. sivalensis* complex
3. Femur short (FEL 70.6–78.4% of TBL), ventral scales 87–108. . . . . 4
- Femur long (FEL 80.0–84.8% of TBL), ventral scales 65–69, breeding males have bright red patch at the middle of the throat-fan . . . . . *S. ponticeriana*
4. Throat-fan short (ADW 28.3–29.2% of AG), midbody scales 49–56, ventral scales 87–89, lateral scales mucronate, ventral scales mucronate in females . . . . . *S. bahiri* **sp. nov.**
   Throat-fan long (ADW 29.9–32.5% of AG), midbody scales 57–59, ventral scales 100–108), lateral scales rounded, ventral scales rounded in females . . . . . *S. devakai* **sp. nov.**

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**APPENDIX I.** Additional specimens examined.

***Sitana* cf. *devakai*.** Male, (ZSI/SRS 188), SVL 43.0 mm, Thirunelveli, Tamil Nadu, India; Male, (ZSI/SRS 358) SVL 53.9 mm, Thirunelveli, Tamil Nadu, India; Male, (ZSI/SRS 227), SVL 42.4mm, Pudukottai, Tamil Nadu, India.

***Sitana* cf. *ponticeriana*.** Male, (ZSI 5051), SVL 43.4mm; Male (ZSI 5052), SVL 40.4mm; Male (ZSI 5053), SVL 39.6mm; all from south-eastern Berar & Chanda (north-eastern India); Male (ZSI 22720A) SVL 48.6mm; Male (ZSI 22720B), SVL 49.3mm; Male (ZSI 22720C), SVL 44.7mm; Male (ZSI 22720D) SVL 44.7mm; Male (ZSI 22720E) SVL 46.7mm; all from Orissa, India. See the following corresponding figure in Manthey (2010): RA04162-4 (page 153).

***Sitana deccanensis*.** Male, (BNHM 261), SVL 66 mm; Male, (BNHM 267), SVL 65 mm; Male, (BNHM 268), SVL 63 mm; all from Maharashtra, India.

***Otocryptis wiegmanni*.** Male, (ZMB 708), SVL 60.0mm (holotype of *Otocryptis bivittata*, see Amarasinghe *et al.*, 2009; Bahir & Silva, 2005); Male, (WHT 1496) SVL 48.9mm, Haycock near Hiniduma (Galle), Sri Lanka.